

The Iron Age

INDEX TO
READING MATTER
PAGE 38.

A Review of the Hardware, Iron and Metal Trades.

INDEX TO
ADVERTISEMENTS
PAGE 25.

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The Hopson & Chapin Mfg. Co.

The works of this company, which were formerly at Wethersfield, Conn., were removed about a year ago to New London. The new establishment, which has been planned in the light of long experience, is especially well arranged for the economical production of work, and many features about it will interest our readers. The Wethersfield shops during the eight years they were occupied were enlarged at four different times, indicating a steady growth of business, as well as affording a basis of practical experience in the arrangement of manufacturing plant which has been utilized in this last and most important extension of all. The new works occupy a block of ground adjoining salt water on one side and

shipping-room and stock sheds, as also shown in the plan.

While the work in the foundry of this establishment is that which perhaps has the greatest interest for our readers, and is that to which we design directing particular attention, it cannot well be considered independent of other features. What is known as the main building, which is a three-story structure 35 x 100 feet in plan, is located just back of the foundry. This is employed as the machine and finishing shop. At one end of this building is an addition of 19 x 45 feet, known as the forge-room, while beyond it in turn is a building 30 x 50 feet, in which are located the tumbling barrels for cleaning castings. A wing extending outward from the main building in the direction of the foundry, two stories in height, is occu-

cate patterns are stored, and the foundry office. The location of the latter apartment is immediately opposite the platform scales, which are placed in the space between the office building and the end of the foundry. The entrance to the works for teams, and also for materials received by water, is through this passageway and across the platform scales. The end of the foundry building toward the office is occupied by the wood-pattern shop, the metal-pattern shop, and by divisions appropriated to the storage of flasks, follow-boards, &c. Much care has been exercised in planning the establishment, not only to facilitate transportation of materials and product from one point to another, but also to secure one direction of movement through the establishment, thus avoiding the loss incidental

placed on the second floor of the main building, and from this point to the cupola there is a 12-inch sheet-iron pipe, indicated by the dotted lines in the plan. The steam supply of the establishment for both power and heating is furnished by two horizontal tubular boilers, 4 feet and 5 feet in diameter respectively and 15 feet long. Either of these is of sufficient capacity for both the power required in operating the machinery and the heating of the works, unless it be in the severest weather; accordingly, one of these is ordinarily in reserve. The engine used is of the automatic type, and was built by the well-known firm of C. H. Brown & Co., of Fitchburg, Mass. It has a nominal horsepower of 60. In another article we shall lay before our readers the system of cost records maintained in these works, to the

7. If so, when did the depression begin; when did it reach its lowest point; and what are its most prominent symptoms?

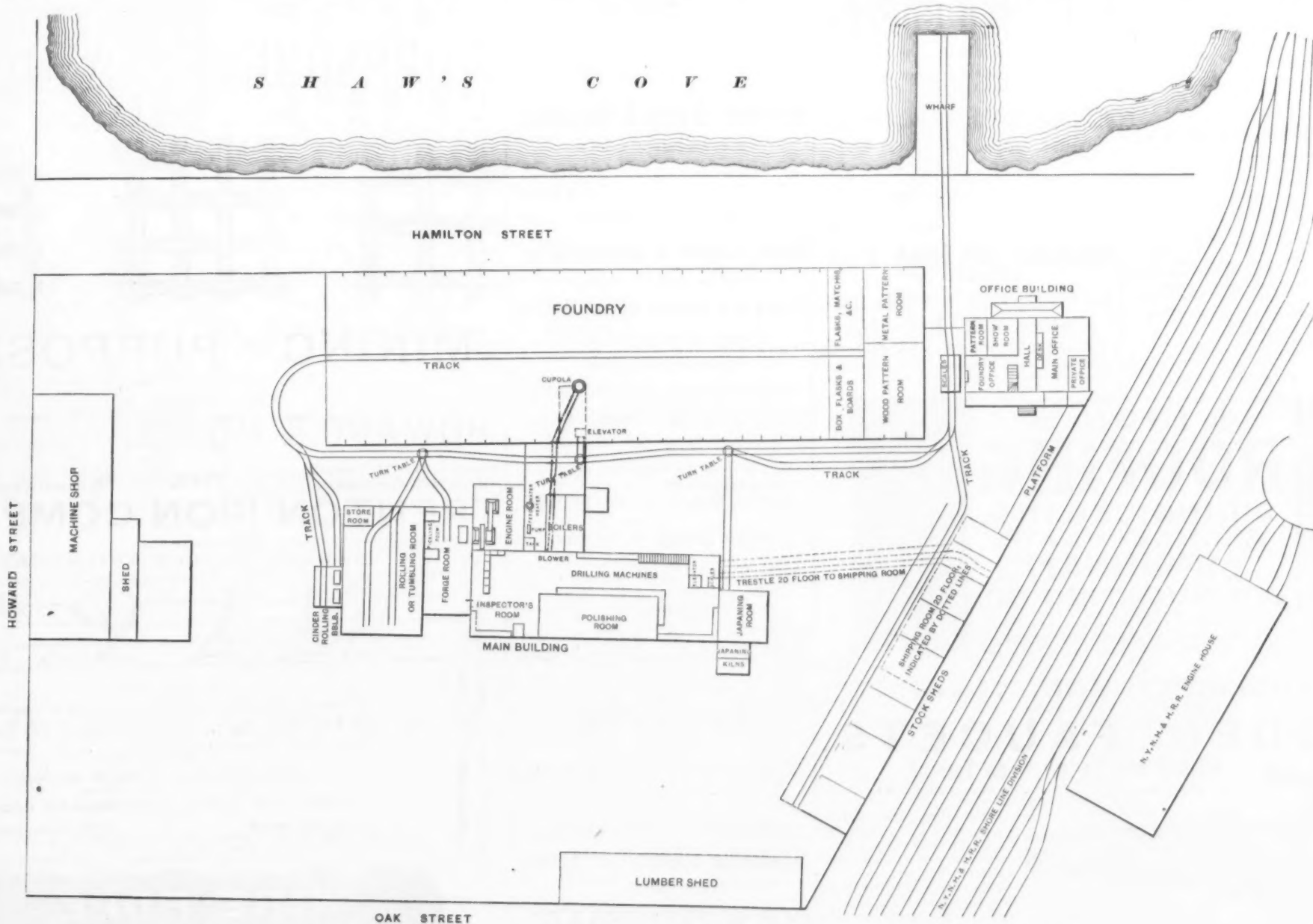
8. Has its progress hitherto been uniform or irregular; and what do you anticipate that its course will be in the immediate future?

9. Have the different trades and industries affected been uniformly affected (a) in time and (b) in intensity?

10. Are there any special circumstances affecting your district to which the existing conditions of trade and industry there can be attributed?

11. Should you say that (a) the demand for, (b) the supply of, (c) the return on capital in your district is above or below the average of the last 20 years?

12. Is the rate of wages in relation to ser-



GENERAL PLAN OF THE WORKS OF THE HOPSON & CHAPIN MFG. CO., NEW LONDON, CONN.

a private switch connecting with the tracks of the New York, New Haven and Hartford Railroad on another. It faces streets of the town on the two remaining sides, and is in all respects a very desirable site.

The business of the company may be described as the production of light castings of fine surface and accuracy. Their product enters into oil stoves, kerosene-lamp fixtures and various other similar goods. The foundry is a building 70 feet wide by 240 feet long. The framework of this structure is unique, consisting of a series of arch trusses, making a section through the building equal to a segment slightly less than a semicircle in amount, and leaving the floor without obstructions. These arches are composed of a series of inch boards fastened together by nailing. They support the roof, and, with the exception of the framework of projections along the sides of the building by which vertical walls to the height of windows are obtained, and the framing of a turret ventilator along the top, they constitute the entire skeleton of the building. The location of the foundry with respect to the office, machine shop, shipping-rooms, &c., will be understood by a glance at the accompanying diagram, which represents a general plan of the works. The plot of ground which the establishment occupies has a frontage of 447 feet on Hamilton street, 285 feet along the tracks of the New York, New Haven and Hartford Railroad, 310 feet at the rear on Oak street, and 250 feet on the side on Howard street. An arm of the bay, known as Shaw's Cove, fronts the works, as indicated in the plan. A private wharf has been built, on to which a branch of the narrow-gauge railway track, which is a conspicuous feature of the works, extends. A switch from the tracks of the New York, New Haven and Hartford road runs immediately back of the

pied in the lower portion as an engine-room, and on the second floor as a tool-room. The boiler-house is in the form of a shed which connects the foundry and the main building. The chimney stack stands midway between the foundry and the main building and immediately adjacent to the boilers. An extension at the opposite end of the main building from the one already described is occupied for jappanning purposes, for which the kilns or ovens are built outside, as indicated in the plan. Communication from the main building to the shipping-room is by means of an inclined trestleway running from the second floor. At the rear of the lower floor of the main building is located the inspectors' room for the sorting of castings. A portion of this floor along the foundry side is occupied by a number of drilling machines required in fitting certain classes of work. A polishing-room is also partitioned off, in which are located grinding-wheels and other similar machinery. The second floor is occupied as a general machine shop, with a division near the office end devoted to marbling, for the finish of clock cases and other fine work. The upper floor is also subdivided, affording rooms for gliding and other processes pertaining to the finish of fine work, also for painting, wrapping, packing, &c.

The office of the establishment occupies a commanding position, and is subdivided, so as to afford all necessary facilities in overlooking and managing a business of such fine detail as the one we are describing. The front of the building is furnished with a porch from which the entrance is by way of a central hall. On the left going in is the main office, with private office partitioned off, as shown in the plan. On the right is a showroom in which are gathered various samples of the work executed by the company, a pattern-room in which fire and deli-

to carrying materials further than is absolutely necessary, or that which results from work frequently crossing its own track. Care has also been taken to so arrange the passage of work in progress from one department to another as to facilitate the records of cost, which are to be described in another article, and which are a very important feature of the management of this establishment. The storage of coal, coke, sand and the different grades of pig iron employed is in the sheds under the shipping-room, shown alongside the railroad tracks in the plan. A branch of the narrow-gauge track running through the works extends to these sheds. If its course on the plain is followed, it will be noticed that it is not provided with a turn-table, but that it leads to the scale platform already mentioned, instead of directly to the cupola. The purpose of this is to prevent any material getting into the foundry without being weighed and recorded. A switch is located on the scale, and the cars, in being run off from it, are thrown on to the line of track leading to the cupola. Opposite the elevator for conveying iron and fuel to the cupola platform is a turn-table. By this means the car is run upon the elevator, hoisted to the proper level, and then on another spur of track run directly to the mouth of the cupola, thus reducing the handling of material to a minimum. A branch of the track also runs down the center of the foundry, and cars upon it are used for gathering up the product of a day's work and conveying the same to the tumbling barrels located, as we have already described, at the rear of the main building. In the same way material is also conveyed to the cinder rolling barrels, located still further in the rear, and for general transportation about the premises.

The cupola is located centrally in the foundry. The blower supplying the blast is

proper understanding of which this general description of the premises and the facilities of manufacture was necessary.

The English Commission on the Depression of Trade.

The following circular to chambers of commerce, issued by the newly-appointed Commission on the Depression of Trade, has been generally ridiculed by the English press, as it deserves to be:

1. What is the area embraced in the district on which your chamber is prepared to report?

2. What trades or industries are of special importance in that district as measured by (a) the amount of capital invested; (b) the amount of labor employed; (c) the amount of production?

3. In what proportion does the trades and industries of your district find their market at home or in foreign countries, and, as regards the latter, in which countries chiefly?

4. How has the trade and industry of your districts been affected in the last five years as compared with the periods of 1865-70, 1870-75, 1875-80, as regards (a) its volume; (b) its gross value; (c) its net profit; (d) the amount of capital invested; (e) the quantity of labor employed?

5. The phrase "depression of trade" would appear to imply a "normal level" of trade. During what periods in the last 20 years should you say that trade had been (a) at its normal level; (b) above that level; or (c) below it?

6. Judged by a scale constructed in this manner, can the condition of trade and industry, or that of any special trade or industry, in your district at the present time be fairly described as "depressed"?

vice rendered, and to the quantity of the works produced (a) for skilled and (b) for unskilled labor in your district, above or below the average of the last 20 years?

12. What measures could, in your opinion, be adopted to improve the existing condition of trade (a) by legislation and (b) independently of legislation?

14. To what extent do you consider that the present condition of trade and industry in your district has been affected by the operation of any of the following causes: (a) Changes in the relation between capital and labor; (b) changes in the hours of labor; (c) changes in the relations between the producer, the distributor and the consumer; (d) fall in prices or appreciation of the standard of value; (e) the state of the currency and the banking laws; (f) restriction or inflation of credit; (g) overproduction; (h) foreign competition; (i) foreign tariffs or bounties; (j) incidence of taxation, local or imperial; (k) communication with other markets; (l) legislation affecting trade; (m) legislation affecting land?

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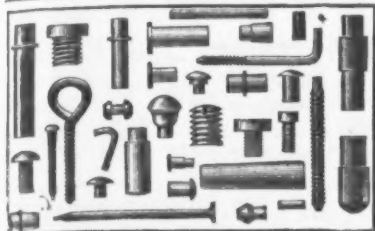
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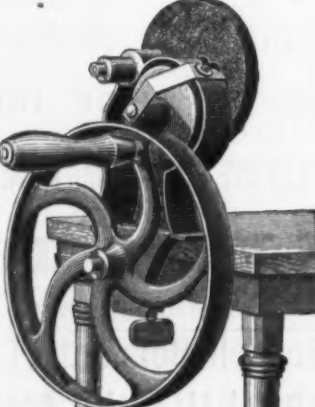



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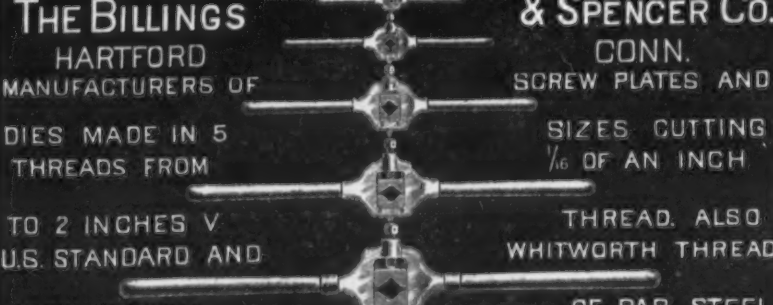
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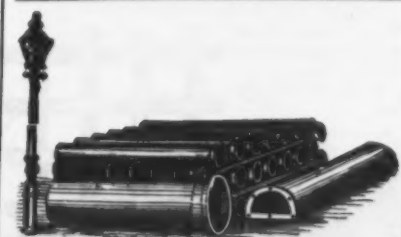
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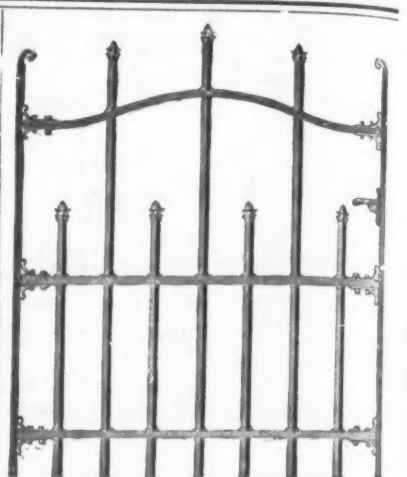
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FIRE INSURANCE—FRAUD—REFUSAL TO PAY
LOSS.

G., in Georgia, was insured, and on the loss of his property, after due proof, the agents of the company offered to pay him at once if he would discount it at 7 per cent. for the 60 days. He declined to do this, as he could not use the money at any better rate of interest. Immediately on the expiration of the 60 days he applied for payment, but was told by the agents that the check had not arrived, which was not the reason of the delay, and they continued to put him off until at length they demanded the policy for cancellation, on the ground that there had been a fraudulent concealment by him, G., of a previous incipient fire, and they threatened to sue him if he did not give up the policy. It appeared on the trial of the action brought to recover the insurance money that four days before the burning of the property an incipient fire had occurred, but the loss was so trifling, about 50 cents repairing, that G. thought it of no moment, and made no report of it. In Georgia there is a statute which allows, besides the principal and interest, against an insurance company which in bad faith refuses to pay a loss, 25 per cent. damages and \$500 attorney's fee. The plaintiff recovered his loss with interest, and the jury added 10 per cent. damages and the attorney fee claimed. The company carried the judgment—Watertown Fire Insurance Company vs. Grehan—to the Supreme Court of Georgia, where the plaintiff succeeded again. Judge Hall, in the opinion, said: "1. Where the company seeks to avoid the policy under the clauses against fraud, it must show a willful intent to defraud rather than an innocent mistake. 2. We think the facts in evidence certainly justified the jury, although they might not have been required to find the extra damages and attorney's fee for the plaintiff. The real cause for refusing payment, information which implicated him in the burning, the agents did not communicate to the plaintiff until he had threatened the company with suit; and even after the commencement of the action these agents threatened to prosecute him, to compel him to settle for a mere 'stipend,' to use their own language to the company. The evidence shows the correspondence between the agents and the company, and it shows that their action was, in all probability, directed to force the plaintiff to settle with them on their own terms. The jury doubtless considered this proof of bad faith, and acted on this presumption in giving damages for delaying payment."

TELEPHONE COMPANY—FALLEN WIRES IN
STREET—FIRE.

N., who was injured by tripping over fallen telephone wires in the street at night, sued the city and telephone company for damages. On the trial of the case—Nichols vs. City of Minneapolis—it appeared that on January 31 there was a fire at which the firemen, in throwing water on the building, threw it on the cross-bars supporting the wire to such an extent that the ice accumulated so that they were broken from the poles and dragged down into the street all of the wires, 40 of them. The next day this section of wire was cut and new wires put up, but the old wires were left in the street. The plaintiff recovered judgment against the city and the company, and both these appealed to the Supreme Court of Minnesota, where the judgment was affirmed. Judge Mitchell, in the opinion said: "1. The neglect of the city to remove the wires for an entire week makes it clearly liable. 2. The license to the company to erect poles and run wires had its burdens. It carried with it an implied obligation to erect and maintain these wires in a safe condition, so that they should not become nuisances or endanger the safety of the traveling public, and if it suffers them to fall and remain in the street it is liable to any one injured thereby."

USE OF PATENTED MACHINE—INJUNCTION—
DAMAGES.

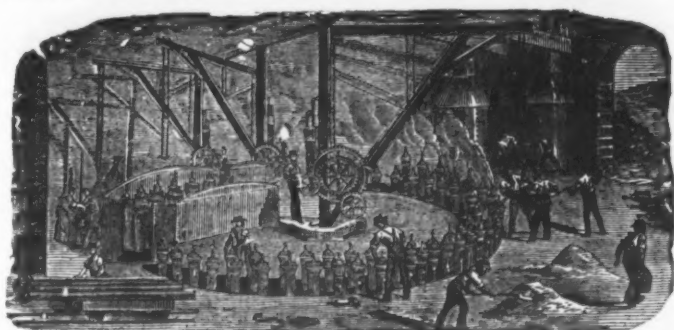
S. built a machine for the burning of sawdust and other refuse of sawmills, and sold it to P., who put it in use. This machine had been patented, and the owners of the letters patent filed a bill against S. and P. to restrain the use of the machine, and for an accounting of the profits made in its use. In this case—Smith vs. Sands—brought in the United States Circuit Court, W. D. of Michigan, S. D., it was not claimed that S. intended to make any more machines; the suit was confined to this machine in use by P. The defendants contended that the complainant should not sue in equity, but must bring an action at law for damages against P., and that the measure of damages was a royalty or just license fee for the use of the machine. Judge Withey, in the opinion supporting the position taken by the defendants, said: "Peters uses this machine only in his sawmill, for disposing of the sawdust and refuse of the mill; it is not employed in the manufacture of any article or thing for market or for sale, and it is for the interest of the complainants that all sawmills use their patented machines, provided they are paid the price of a license. The extent of their injury for using a single machine infringing their patent is the royalty or a suitable license fee. When once they have been paid the price or value of a license they have received the full measure of the 'actual damage' they suffer for any particular infringing machine used by another, and it is the full remedy they are entitled to, except a court may treble the actual damages if the circumstances justify it. Upon the recovery of this royalty or license fee, there being no ground for treble damages, any subsequent suit for further damages would be barred for full compensation for the use of the machine has been got. No injunction, therefore, can be had against Peters, and, as to S., it is not even claimed that he proposes to make any more machines, so an injunction will not be granted to restrain him. The bill must be dismissed."

SALE—MEMORANDUM OF ITEMS AS EVIDENCE.

S. sold, through his agent, to B. a quantity of ready-made clothing, and on payment being refused brought suit. On the trial the plaintiff offered in evidence the memorandum he had made at the time of the sale of the

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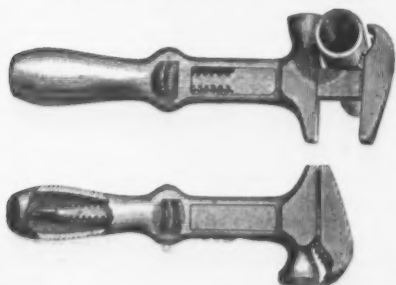
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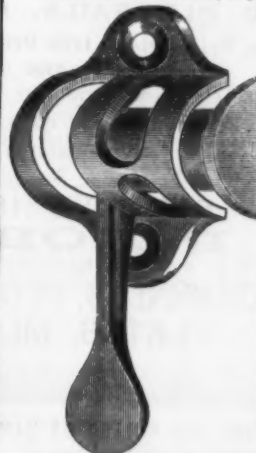
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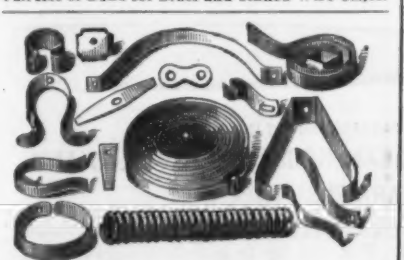
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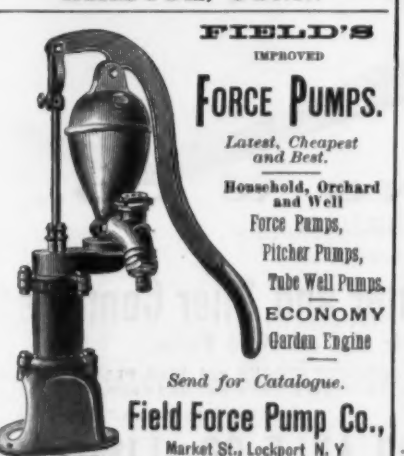
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without extra charge.
The fact of the great strength and durability of this sink, as it is practically free from danger of
breakage in transportation, handling or use, is a strong point in its favor, and that its merits are
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interested in the common article have taken up the Wrought Steel Sink. Twenty-five per cent. is
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specific goods ordered, opposite which the
prices to which the defendant assented were
fixed, and the memorandum was received in
evidence against his objection. To the de-
fense that he had not accepted the goods, it
was shown that he had sold some of them.
The plaintiff had judgment, and the defend-
ant carried the case—Singer vs. Brockamp—
to the Supreme Court of Minnesota, where
the plaintiff again succeeded. Judge Van-
derburgh, in the opinion, said: "1. As to
the introduction of the memorandum, this
method of proof in the case of original
memoranda, as this was, the particulars of
which it would be difficult to recollect with
accuracy, when properly verified by one
who was personally cognizant of the facts
and the correctness of the entries, as was
shown here, is very common, and is resorted
to from the necessity of the case for a de-
tailed statement of items. 2. The defendant
received these goods with an invoice which
was a copy of the memorandum, and had
sold a portion of them before he refused to
pay; he made no objection to the articles
until he was sued. This is sufficient proof
of itself to support the finding that his order
was properly filled and of the acceptance of
the goods."

SALE ON CONDITION—ARTICLE TO BE
SATISFACTORY.

H. sold to W. an engine and boiler for his
mines, and payment was to be made in one
year if this machinery worked to S.'s sat-
isfaction. About six weeks after the sale S.
made an assignment for the benefit of his
creditors, and the assignee ran the mines for
nearly a year, using this machinery, and he
sold it. H. brought replevin to recover the
machinery from S., the purchaser. It ap-
peared on the trial of the case—Hickman vs.
Shimp—that W. had used the machinery,
but had not expressed any opinion about its
merits, and that a month after the assign-
ment H. had been at the mines to repair the
engine, but that he took no steps to get the
machinery back until he sued S. in replevin.
H. recovered a judgment, and the defendant
took it to the Supreme Court of Pennsylva-
nia, where it was reversed. Judge Clark,
in the opinion, said: "The contract was a
conditional one; it provided for the subjec-
tion of the engine to trial, and became abso-
lute only on approval. But such a contract
created a condition which must be satisfied
before the promise he qualifies becomes ef-
fectual; it is therefore a condition prece-
dent, and the title will not pass until the
option is determined. In this respect it
differs from what is denominated among
merchants 'a sale and return,' which creates
a condition subsequent merely, and passes
the title at once, subject to the right to re-
scind and return. In the event of disap-
proval the seller is entitled to notice; if a
time is fixed for the exercise of the option,
the buyer has that time and no more, but
when none is specified a reasonable time will
be implied. In either case, however, it is
the duty of the buyer, if he disapproves,
to inform the seller in due season, or the con-
tract will become binding on him by the
resolution of the condition. The buyer's
approval may therefore be implied from
mere neglect to notify, or from any act or
course of conduct in relation to the property
which necessarily involves an unequivocal
assertion of his absolute ownership of it, as,
if he should sell it to another, or pledge it
for the payment of his own debt. The
general assignment under which this engine
and boiler were delivered to the assignee
was an assertion of property in them by W.,
and he could then have taken steps to re-
cover the machinery. But now it is too late,
and the purchaser from the assignee cannot
be deprived of the property after he has paid
for it."

METALLURGICAL.
Recent Tests of Rail Steels.

A very interesting series of tests of rail
steel has recently been made at the Edgar
Thomson Steel Works of Messrs. Carnegie
Brothers & Co., Limited. We reproduce
below the table embodying the results ob-
tained:

Number of test.	Physical Tests.				Chemical Analyses.		
	Ultimate Tensile Strength, Pounds per square inch.	Limit of Elasticity, Pounds per square inch.	Elongation in 8 inches, Per cent.	Reduction of Area, Per cent.	Carbon, Per cent.	Manganese, Per cent.	Phosphorus, Per cent.
1	107,010	66,639	15.0	23.2	0.42	0.98	0.10
2	98,816	65,666	19.1	37.2	0.36	0.98	0.10
3	98,814	62,259	17.8	29.2	0.36	0.97	0.10
4	98,072	61,176	18.5	34.5	0.36	0.97	0.10
5	98,823	60,723	18.7	38.6	0.36	0.96	0.10
6	98,299	59,136	18.3	30.3	0.36	0.96	0.10
7	96,136	58,920	18.0	30.5	0.36	0.95	0.10
8	95,743	60,383	18.6	36.2	0.36	0.96	0.10
9	95,033	60,478	18.3	27.6	0.35	0.94	0.10
10	95,005	59,182	18.5	29.4	0.35	0.94	0.10
11	94,282	59,545	19.8	35.8	0.35	0.93	0.10
12	95,634	59,194	19.8	34.4	0.34	0.93	0.10
13	93,480	58,680	19.4	36.0	0.34	0.92	0.10
14	92,955	60,329	20.4	39.8	0.34	0.92	0.10
15	91,668	57,895	19.9	35.7	0.34	0.91	0.10
16	91,827	57,978	19.7	30.5	0.34	0.90	0.10
17	91,651	57,753	21.5	37.9	0.34	0.90	0.10
18	90,612	57,760	20.8	42.4	0.34	0.89	0.10
19	90,518	57,974	21.4	40.2	0.34	0.88	0.10
20	90,140	58,334	18.6	24.9	0.36	0.87	0.10
21	90,000	57,700	18.7	37.0	0.38	0.86	0.10
22	89,901	57,402	20.6	34.0	0.32	0.85	0.10
23	89,901	57,279	20.8	30.3	0.32	0.84	0.10
24	89,361	55,890	20.4	39.0	0.32	0.83	0.10
25	88,557	57,891	20.9	35.1	0.31	0.82	0.10
26	88,100	57,830	19.5	29.0	0.31	0.81	0.10
27	87,954	56,360	18.0	34.0	0.31	0.80	0.10
28	86,308	55,055	19.8	28.6	0.30	0.79	0.10
29	85,287	56,438	21.9	44.9	0.30	0.78	0.10
30	84,613	55,159	22.3	43.7	0.30	0.77	0.10

It will be observed that the series consists of
steels beginning with carbon as high as 0.42
and manganese 0.98, decreasing both those
elements in a regular manner. The decrease
in the tensile strength is remarkably uni-
form, the elastic limit showing a like gradual
falling off as milder material is reached,
though not in so regular a manner. The
record of the elongation shows greater fluc-
tuations. An examination of those members
of the series in which the carbon remains
constant while the manganese declines
shows a smaller percentage of the latter de-
creases the tenacity, while not much affect-
ing the ductility. The results indicate a
certain parallelism in the effect of carbon
and of manganese. How much possible
slight variations in the silicon contents in
this series of tests tend to obscure these re-
lations it is impossible to judge in the absence
of determinations. Aside from its interest

as bearing upon the relation between chem-
ical composition and physical properties,
this series shows a very high quality of
metal.

Analyses of Swedish Iron and Steel.

In the Swedish department of the Ant-
werp exhibition the trustees of Lars Lind-
berg's estates have shown iron and steel from
Kohlava works of almost chemical purity.
These are derived from the charcoal pig iron
of Dahlkarlshtye, whose composition is the
first of the following analyses:

	Carbon, combined.	Silicon	Phosphorus	Sulphur	Manganese
1.	1.500	0.080	0.050	0.030	0.020
2.	2.100	0.444	0.028	0.033	0.014
3.	0.023	0.023	Trace	Trace	Trace
4.	0.060	0.020	Trace	Trace	Trace

It is a Siemens ingot, and III bar iron
made in the Lancashire forge, which gave the
following results when tested:

	(Kg. per sq. mm.)	Siemens ingot.	Bar iron.
Elastic limit	12.68	14.26	
Ultimate tensile strain	32.47	30.63	
Elongation, per cent.	38.3	37.4	
Contraction of area, per cent.	74.1	73.8	

Here the ingot iron, as is usually the case,
appears to be a little more rigid than the
hammered bar, probably as being more ho-
mogeneous. Wire made from this iron has an
electric resistance of only 0.009705 ohm
per lineal m. per mm. square of section, or
considerably less than that usually attributed
to pure iron.

The Manufacture of Ferromanganese.

Some time since we reproduced the lead-
ing points of an article by M. Pourcel, the
French metallurgist, on his experience in
the manufacture of ferromanganese. Stock-
mann, of Ruhrort, a German authority, re-
views the paper in question and asserts that
it is not at all necessary to use a plumbago
lining provided the cinder is sufficiently
basic. His rule is to make a cinder in
which the oxygen in the gases, lime, mag-
nesia and alumina is at least as great or
greater than the oxygen contents of the
silica. He states that a high-blast tempera-
ture is by no means necessary, and leads
only to the production of a ferromanganese
containing a good deal of silicon. He has
worked with a blast at 420° Celsius. He
urges that M. Pourcel simply does not use
enough lime.

**Using Molten Pig in the Open-
Hearth.**

Mr. F. J. R. Carulla, of Swanscoe, writes
to the English engineering journals on the
subject of saving time in open-hearth work
by charging the pig iron in a molten condi-
tion, as follows: "Mr. Riley truly stated that
arrangements had been designed at Landore
during his time to take the metal from the
blast furnace in a molten state direct into
the Siemens furnaces, and I was much sur-
prised on taking charge of the steel works to
find that this had never actually been done.
An elevated road to take a ladle carriage
was shortly afterward constructed, and the
experiment tried on a working scale, with
the happy result—if I remember right—that
as much as two hours would sometimes be
saved in the complete conversion of a charge.
Certainly a considerable economy of time
was always effected. It was, however,
found that, owing to the impossibility of
testing the metal, inferior charges would oc-
casionally be introduced into the Siemens
furnaces, resulting in steel worthless for the
intended purpose. The seriousness of this
difficulty will at once be appreciated by all
steel-makers, and, when it is added that the
blast furnaces were under the control of a
separate company and another management,
the fact that the process had at last to be
discontinued is not surprising."

Blisters in Sheet Iron.

Arnold Friedmann, chemist of Diosgyör
writes to *Stahl und Eisen*, reporting an in-
vestigation made by him in 1883 at the
Reschitz Works into the blisters on sheet
iron. In the finishing of a sheet a blister
was formed which rose pretty uniformly on
both sides. It was drilled into under water,
and the gas, a little more than 100 mm. in
volume, was analyzed with the following re-
sult: Carbonic acid, 20.85 per cent., by
volume; carbonic oxide, 70.42 per cent., and
oxygen, 0.85. The presence of oxygen in-
dicated that the gas was not collected quite
free from air. Within the blister peculiar
scales were founded, easily distinguished
from the iron which was analyzed. The re-
sult was as follows:

	I.	II.
Silica (soluble in hydrochloric acid)	0.45	0.50
Silica (insoluble)	73.25	63.80
Lime	3.05	1.10
Magnesia	0.84	1.49
Oxide of manganese	0.77	0.76
Sesquioxide of iron and alumina	23.30	33.65
Total	100.56	101.30

The Fire Department of New York is de-
servedly popular. The members number
950, and they handle 54 engines in active
service, 19 hook and ladder trucks, two
water towers for use on high buildings,
and two fire-boats that are manned like the fire-
houses, with the exception that each needs a
pilot, engineer and corps of deckhands. One
boat serves the North River front, and one
that of that of the East River. Each boat
lies regularly at a certain wharf, down
which wires of the fire electric plug the alarm
gong in the boat is connected with the en-
tire telegraph system of the department.
The average time it takes for an engine to
leave a fire-house is 10 seconds. The patent
half-automatic hitching apparatus is used in
every engine house, and all the horses are
trained to leave the stalls when the alarm
sounds, and the automatic machinery un-
hitches the halter bolts and leaves them free
to move. The sliding bars of polished brass
that are now substituted for the old-fashioned
stairs are in almost every house. The
hitching apparatus is a San Francisco inven-
tion first used in New York. The slide pole
is a Cincinnati idea which New York was
proud to copy. From St. Louis the New
York firemen borrowed the idea of the life-
saving corps and their scaling ladders. No
man can now become a fireman who is not
an adept in the use of these simple, but ad-
mirable, ladders. Each candidate spends 21
days in the training school, and cannot be
admitted to the force unless he is handy with
the ladder.

Paris, 1878.

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Trade Price List { No. 1, Blue Top, per pair, \$5.00. } Discount to the Trade.
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The characteristic feature of the invention is a curved blade, provided with saw-tooth cutters, and furnished with suitable working handles. It is our purpose to prosecute all infringers of our patent, and we have already commenced one suit, which is nearly ready for hearing, and are about commencing suits against other parties.

All manufacturers are hereby warned of our rights, and the public are cautioned against purchasing any Hay "Saw Knives" which are not of our genuine manufacture.

HIRAM HOLT & CO.

EAST WILTON, May 26, 1884.



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 Pillar,
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 Reaper,
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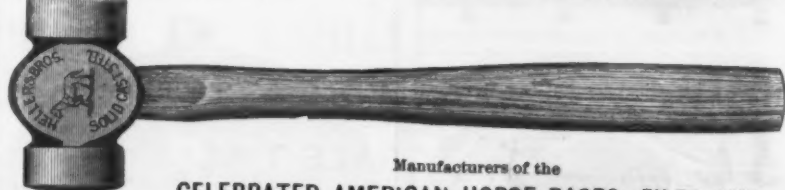
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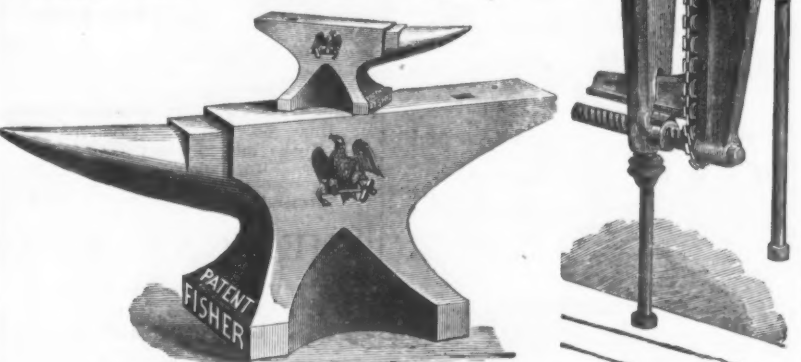
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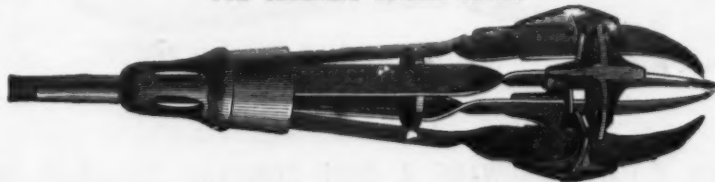
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English Letter.

(From Our Regular Correspondent.)

LONDON, SEPTEMBER 14, 1885.
THE SITUATION

is in many respects very much the same as it was when I last wrote. So far as my information serves me, the improvement in the general condition of the iron trade is fairly maintained, and there are not wanting symptoms of further developments. Those who still pin their faith in the course of things as typified by the price of Glasgow warrants (and it is an extraordinary fact that the price of copper on the London Metal Exchange is largely influenced by Scotch warrants) are extremely jubilant, and exultingly refer to the great advance in values during the past 10 days. We who are not quite so optimistic and have long learned the art of paying very little attention to the doings of the ring which gambles with warrants in one corner of the Glasgow Royal Exchange know that Scotch warrants are not safe and sure guides. One day last week, for instance, these securities were rapidly run up to 43/11, although they finished the same day at 43/1. However, speculators have once more got hold of iron in the shape of warrants, and they seem to have persuaded themselves that they can turn their money over with advantage to themselves prior to relinquishing their "little game." Passing over warrants, however, there seems to be no valid reason for doubting that almost or quite all grades of crude iron have been stiffened to the extent of 1/2 @ 2/6 per ton. Scotch special brands have been advanced. Cleveland pigs have followed, and the smelters all over the country have boldly stood out for the new view of things. It is more important to learn that buyers are paying the enhanced rates, and there are so many inquiries about in all directions that an enlarged business is very likely to be done in the near future. This remark also holds good in respect to many kinds of finished iron, the demand for which is increasing, partly on behalf of consumers and in part from merchants who think it time to supply their possible requirements a little further ahead than has been their custom of late. The sheet mills are reported full of work for some months forward, and sheets, as well as strips, are 2/6 @ 5/ per ton higher in the open market. Whether your sheet mills are similarly occupied I am naturally unable to say, but it is a fact that there are American inquiries here for sheet iron. In many lines of hardware there is a considerable accession of orders, either as the natural sequence of the good harvest or because the retailers and others have been frightened into buying by the reports of advancing prices. This latter consideration is one which is bound to have much weight at a time when there is no doubt that all retailers and consumers in general are carrying extremely light stocks. For two or three years past all purchasing has been on a purely hand-to-mouth system, the dead level of everything offering no inducement to buy forward. With this sudden spurt all that is changed, and, if retailers and merchants come to the conclusion that there is to be no retrogression, it is extremely likely that we may have a lively period between this and Christmas.

THE IRON MARKET

has been more buoyant during the week, and it has to be recorded that the improved tone alluded to in my last report has been well maintained on the whole. At Glasgow warrants have been rather excited, and a considerable amount of speculative business has been done at higher, albeit irregular, values. On September 3 the price was 42/5, as against 41/8 on September 1; on September 7 it was 42/8 @ 43/5; on September 8 it ran up to 43/11, but closed at 43/1, and on September 10 the closing price was 43/ per ton. Scotch special brands of pig iron are higher on the week by 6d. @ 2/6 per ton, notwithstanding the increase in stocks and the comparatively small shipments. Any new demand for America would doubtless stiffen values considerably, but so far there is no evidence that such a demand is in existence or probable. At Middlesboro' the market has been stronger this week, and No. 3 Foundry has been quoted at 33/ @ 33/6 per ton, or 1/ @ 1/6 advance within the past fortnight. Shipments are on a fairly good scale, but the local demand has not been materially enlarged. On the West Coast hematite pigs stand at about 43/6 for mixed lots in usual proportions, which is 6d. @ 1/ better than the late quotations. The demand is of moderate proportions only. Elsewhere crude irons are all 6d. @ 1/ per ton dearer, and in some cases forward contracts have been entered into on that basis, although the majority of the smelters decline to bind themselves far ahead, under the impression that values are likely to be further stiffened in the future. Heavy manufactured iron is being turned out in moderate quantities, especially for structural, bridge, railway and general engineering purposes. In fencing wire I have no change to note, the demand both for drawn and rolled being relatively poor. For galvanized sheets the call is good, and most of the principal producers report themselves well occupied. The late advance of 5/ is maintained, and may be added to should spelter grow dearer. Merchant iron is steadier all round, and in some lines additional orders of some moment have been placed. The sheet mills are now quite busy, and their owners decline to book further commissions, save at an advance of 2/6 @ 5/ per ton over the rates of last month. Some of these concerns are reported full for months ahead. Strips are likewise firmer by about 1/3 @ 1/6; and bars, &c., appear to have seen their lowest for the time being. As regard bars, squares, flats, &c., there is as yet no general rise, and the producers can take a good deal of fresh work without subjecting themselves to pressure; but they are gradually filling up, and next quarter-day may bring an official advance in values. Old materials are steady, old rails being much more firmly held by the railway companies. There is no special increase in the American demand, but a fair business is being done with Italy, China, &c. Freight rates are un-

changed for the most part, but the late nominal rate of 1/ per ton for pig iron by ordinary steamers from Glasgow to New York has been put up to 1/6. The Swansen direct steamers to America and Canada still take the bulk of the tin plates, the freight to New York being only 8/6 per ton. The Mersey liners are competing keenly for a share of the traffic, but what falls to their lot is comparatively a small quantity. The railway rate forms almost a complete barrier excepting in specially urgent cases, but the numerous coasting steamers from Cardiff, Swansea, Newport, and Llanelli, which run two or three times per week, bring a full complement of plates regularly. In addition to those already running, Bacon & Co. intend running weekly steamers from Cardiff, they having a couple of steamers per week running already from Swansea. The Llanelli steamers bring on the Kidwelly plates, and call occasionally in Burry Port. There the Swansea steamer collect the plates from the various works about Port Talbot, Neath, Briton Ferry and Longport. The low freights at which this is done are the chief means by which the Mersey liners get a share of this large and important traffic. Steel is quiet, but the better tone of trade generally has helped makers somewhat, and they have been in receipt of more orders than for some time past. This applies to Bessemer as well as to crucible and converted sorts. Steel rails are, as of late, at 4/ 15/ per ton for ordinary heavy sections of D. H., and 4/ 17/6 for flanges. The new orders are still scarce, and some of the mills are anything but busy.

SCOTCH PIG IRON.

Scotch pig has been much firmer on the week, and quite a large speculative business has been done in warrants, which reached 43/11 on September 8, but closed at 42/11 @ 43/ on September 11. Special brands of Scotch pig are also 6d. @ 2/6 per ton dearer, despite the unfavorable statistical outlook. There are 89 furnaces at work, against 94 a year ago. In Connal's Glasgow stores there are 619,975 tons—an addition of 980 tons last week—as compared with 584,767 tons this date 1884. Shipments to date are 78,868 tons behind, while the importations of Middlesboro' pig into Scotland are 80,839 tons ahead to date. Current quotations are:

Deliverable alongside.	No. 1	No. 3.
Gartsherrie, at Glasgow.....	47/	45/
Coltness, ".....	47/	45/6
Langloan, ".....	48/6	45/6
Summerlee, ".....	47/6	44/
Calder, ".....	47/	44/
Carnbroe, ".....	46/	43/6
Clyde, ".....	46/6	42/6
Monkland, ".....	43/	41/
Quarter, ".....	42/6	40/6
Govan, at Broomielaw.....	43/	41/
Shotts, at Leith.....	47/6	46/
Carroll, at Grangemouth.....	51/	47/
Kinnell, at Bo'ness.....	44/6	43/6
Glengarnock, at Ardrossan.....	46/	42/6
Eglinton, ".....	42/6	40/
Dalmellington, ".....	44/	40/

MIDDLESBORO' PIG IRON

is much steadier and values have been advanced by 6d. @ 1/ per ton. For G. M. B. the quotations, f.o.b. at makers' wharves in the Tees, net cash, are:

No. 1 Foundry.....	35/6	Mottled.....	31/6
" 2 ".....	34/6	White.....	31/
" 3 ".....	33/	Refined metal.....	30/
" 4 ".....	32/	Kentledge.....	30/
" 4 Forge.....	32/	Cinder.....	30/

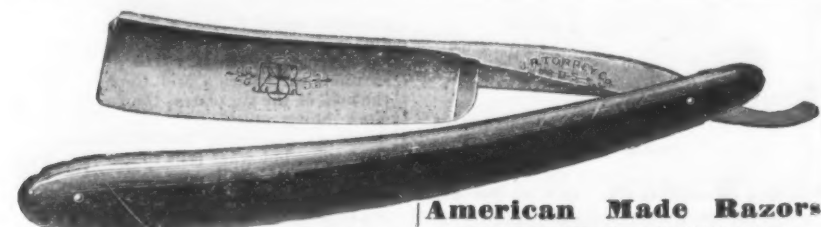
THE BOARD OF TRADE RETURNS

for August are not very satisfactory. They show that the imports were of the value of £28,956,976, or £653,763 less than in August, 1884. It is noticeable that in metals there was an increased importation to the extent of £175,000, largely in iron ore, quicksilver and tin. The aggregate value of the exports was £18,494,633, as against £19,802,057 in the same month of last year, a decrease of £1,307,424. The total decrease of our exports for the eight months ending August 31 was £14,306,585, of which £4,432,078 fell to the share of iron, steel and other metals. The total quantity of iron and steel shipped foreignwise last month was 281,112 tons, valued at £1,825,708, against 273,437 tons and £1,082,563 in August, 1884. To the United States the chief items of export were as follows:

Articles.	Month of Aug., 1885.	Month of Aug., 1884.	Month of July, 1885.
Alkali, cwt.....	182,792	193,618	200,707
Hardware and cutlery, &c.....	23,542	27,372	31,307
Iron—Pig, tons.....	7,149	11,307	6,073
Bar, angle, rod, &c., tons.....	120	691	231
Railroad, all, tons.....	28	1,388	
Hoops, sheets, plates, &c., tons.....	3,300	4,778	2,201
Tin plates, tons.....	17,678	15,544	21,616
Cast or wrought, tons.....	101	359	138
Old, tons.....	255	932	2,158
Steel, unwrought, tons.....	1,013	855	1,131
Lead, all sorts, tons.....	72	72	1
Steam engines, &c.....	1,702	3,980	4,281
Other machinery, &c., &c.....	19,117	20,543	26,084
Tin, unwrought, cwt.....	661	301	200
Special return—Steel rails, tons.....		1,382	

TIN PLATES.

In London there is a distinct improvement in this market since my last, there having been a good deal of buying on American account. The makers show a very strong front, and, as stocks have decreased so materially and are likely to still further decrease, the outlook is certainly of an encouraging nature. I quote IC cokes 14/ @ 14/9, f.o.b. Liverpool. At Liverpool there is a decided improvement in the tone of the market, and prices are better all round. The inquiries sent about are numerous. There seems to be a combination of circumstances which has contributed to the advance, viz., the rapid rise in the price of pig iron, the firmness of tin, and last, but not least, the adhesion of four more works to the restriction combination, which are equal to 20 mills, thus leaving only 50 mills which now work full time, the great majority (350 mills) only working three weeks out of every four. Another important fact has been omitted, viz., the diminution in stocks at Liverpool, as well as in all the Bristol Channel ports, to the extent of 100,000 boxes. All these combined have given the trade a spurt, and have been the means of bringing many buyers into the market, who seem anxious to fix up certain quantities for extended deliveries. The inquiries for Bessemer steels are very numerous, and there are also a few for coke tins. The former still command 14/6 @ 14/9 IC, and the latter in ordinary kinds cannot now be had under 14/—in fact, 14/3 IC has been paid for several. The better class brands



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Manufacturer of Razor Strops & Dressing Cases
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Importer of Fine Razor Blades.

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Brade's Brick Trowels.

O. Ames & Son's Shovels, Spades and Scoops.
F. W. Gilmore & Co.'s Strap and T Hinges.
A. Field & Son's Tacks, Brads, Nails, &c.
W. & S. Butcher's Edge Tools.

GENERAL HARDWARE.



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Although met by the competition of inferior products, we have no intention whatever of lowering the quality, but will endeavor to maintain that high standard of excellence which our Skates have so long held.

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SOLID FORGED STEEL

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The \$5 Hand Mill.

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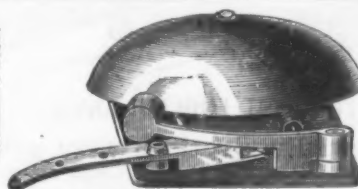
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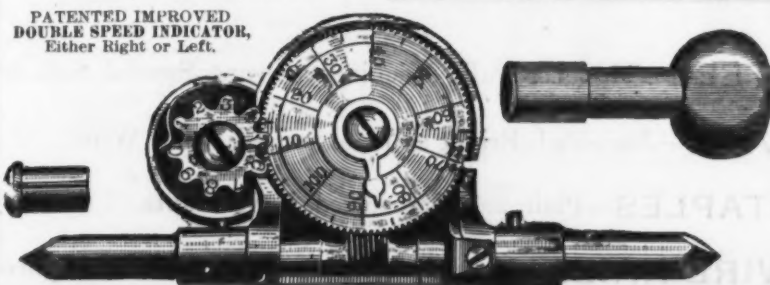
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Either Right or Left.



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Bemis & Call Hardware & Tool Co.



PATENT COMBINATION WRENCH.

Case-Hardened Throughout. Parts Interchangeable.

This Wrench not only combines the superior qualities of a Pipe Wrench but also all the requisite combinations of a regular Nut Wrench, thus making a combination which has no equal.

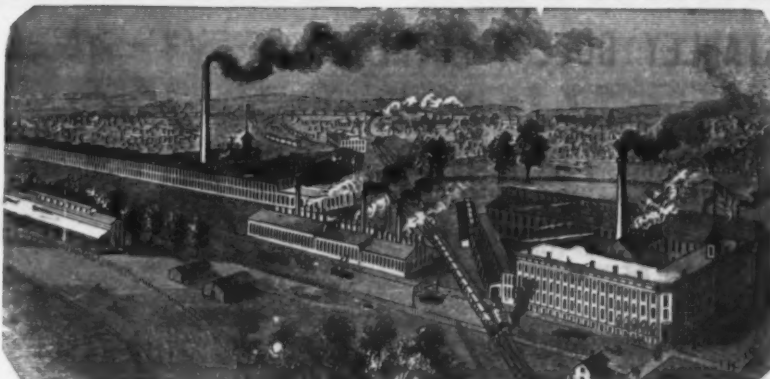


No. 3 PATENT PIPE WRENCH.

The serrated jaws of the Wrench are interchangeable; that is, the same serrated plate may be used for either the stationary or sliding jaw, so that if one plate is broken another can be furnished adapted to either jaw without express designation. The slides, nuts and various parts are also interchangeable, thus easily repairing the Wrench at very small expense, and with as perfect practicability for further use as when the Wrench was new.
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Established in 1839.

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Manufacturers of

THE GENUINE

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Screw

Wrenches.

PATENTED,

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December, 26, 1871.

December, 23, 1875.

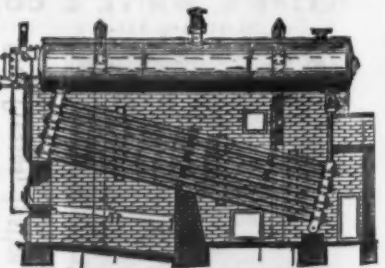
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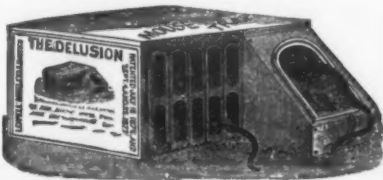
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In addition to Spoons of this well-known brand, we are now prepared to furnish Forks of the same quality. We GUARANTEE these goods to be SOLID and of UNIFORM quality throughout, with no coatings to wear through or flake off, and with no liability to RUST.

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MOUSE TRAP.

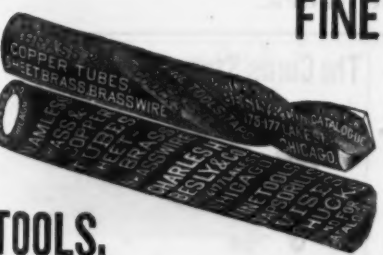
The mouse goes in to get the bait
And shuts the door by his own weight,
And then he jumps right through a hole
And thinks he's out; but, bless his soul
He's in a cage, somehow or other,
And sets the trap to catch another.

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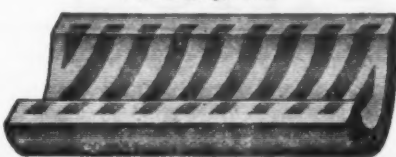
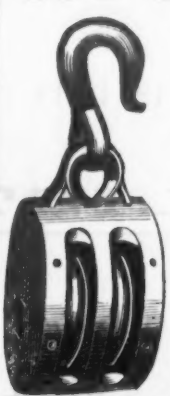
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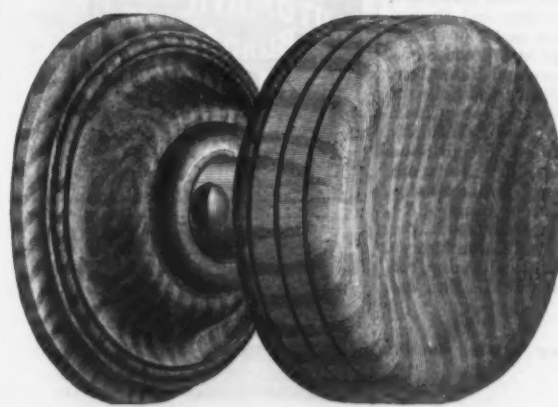
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BARDSLEY'S PATENT.



NO. 101 WOOD KNOB,

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Every pair is positively warranted not to come loose or give out in any way.

We offer this line of Knobs to the Trade with a great deal of pleasure, because we know that they will be so satisfactory in use that, when once used, our customers will have repeated orders for them.

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cannot now be had under 14/6 @ 14/9 IC. Considerably more business could have been done in coke tins if 14/ and 14/3 were freely accepted, but they are not. The Siemens steel plates with coke finish are not so brisk as Bessemer's, only a few orders being to hand but there is no change in prices. There is a brisk demand for ternes, and slightly higher prices than those last offered were paid. The demand for charcoal tins is also much better. With regard to the effect of the combination Mr. James Spence says: "When it originated we had a market grievously depressed. Fair common coke plates were offering at 12/9 and steel coke at 13/3, delivered in Liverpool—both being below the cost of production. Sales were made of both below the rates named. The market had neither a hope nor an argument left in it. And just as we had fallen from 15/ to 14/, from 14/ to 13/6, from 13/6 to 12/9, so we should have been by this time at 12/, or, as some say who are very competent to judge, below 12/, for the same depressing power, overproduction, was in full operation, and there was not a single favorable influence to counteract it. Hence, to form a sound judgment, we must compare the market as it stands to-day with the prices to which we should have drifted down by this time. And, instead of being to-day without a hope or an argument, we have simply to await with confidence the result of the reduction now in progress. With a consumption larger than it ever was before, and with no other competitor to interfere, we have simply to control production, and the supply, regulated to the wants of the market, will inevitably govern prices. Up to the present time the reduction that has been made has not been sufficient to affect much more than opinion. As it proceeds it will come to be felt as a very solid and undeniable fact. Without any desire to bring about high prices, which have always been in the end as injurious as low ones, by moderate views and steadfast perseverance we may return to our former condition—that of a trade giving good employment to men, with a fair return to masters, and at the same time supplying the world on a large scale with an article which in durability, strength, neatness, utility and cheapness combined excels any other British manufacture."

THE HARDWARE TRADES.

At Birmingham little alteration is to be reported in the condition of local industries generally, but a more hopeful tone prevails. Already those houses who devote their attention to dairy appliances are experiencing a slightly better demand, and makers of agricultural implements are also receiving orders with more freedom. The approach of the winter season is causing an increased demand for table lamps, chandeliers and gas fittings generally. Those firms who are engaged in the electro-plate trade keep fairly engaged, but prices continue much cut up, and this applies to a great extent to the button trade also. Makers of bellows are in average employment, the demand being mainly for forge bellows. There is a tolerably brisk demand for galvanized goods, such as baths and buckets, and machinists are, on the whole, in steady employment. At Wolverhampton a little improvement is beginning to show itself. Some of the chief firms announce that during the past week orders have been more plentiful and prospects more satisfactory. The passing away of summer is putting more life into the coal-vase trade, which up to the present has not been an average. This, however, is in some degree compensated for by the circumstance that he trunk season has lasted longer than usual; indeed, this branch of industry is fast becoming an all-the-year-round trade.

In vases, as in summer goods, consumers seem indisposed to give out stock orders, knowing well that they can cover their wants at any period of the season readily by applying to manufacturers. At Sheffield the home consumption of finished goods and season requirements is developing pretty satisfactorily. Scotch lines are a little slow in movement, but from the east and north of Ireland quite a phenomenal crop of orders has come to hand during the last week or two. Australian cutlery orders especially have improved, and for tools and steel a larger demand has been experienced. The United States trade, notwithstanding the reports of good crops and improving business, remains dull, and so does the Indian demand and the Eastern markets generally. There is a slightly improving tendency in the orders from Natal and the Cape.

The Condition of the Sheffield Steel Industry.

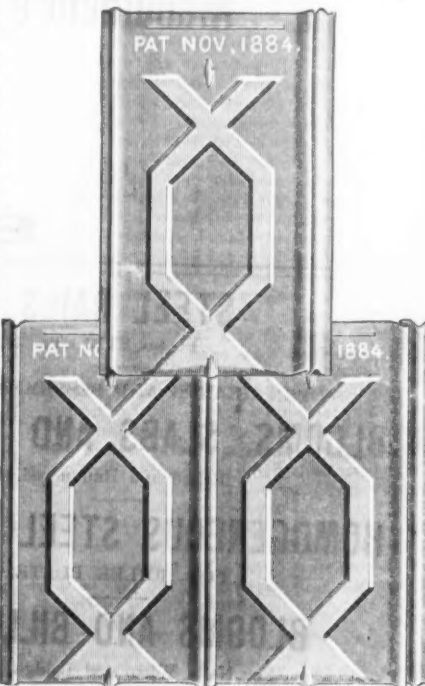
A correspondent of *Engineering* writes as follows on the Sheffield steel industry: "In Sheffield and district the effect of an overproduction of steel in the shape of Bessemer-made is generally noticeable. Instead of the old cast steels controlling the market, the cheapness of the Bessemer has induced a state of things which gives that material the ruling of the market. The competition with German and French makers has induced an undue competition with first-class makers of first-class articles. The result has been that in these days of national rivalry for commercial ascendancy makers of best hand-wrought work have condescended to a competition for a weight of work with rivals engaged in the making of an inferior class of goods. This has effected a large turnover at a low profit, and is but the result of a competition, with companies having capital uncalled, floated under the 'limited' act. The seller of best cast steel is thus met in the market with this—Bessemer steel for tool purposes £13, as against £23 (crucible steel), and in proportion to quality 33 per cent. in favor of Bessemer. In the face of this competition of Bessemer on the one hand, and of the market on the other, it must be seen that makers of crucible steel are at a considerable disadvantage, and, as new reductions in price are constantly occurring with the latter, it must indicate a reduction in the quality of the material supplied, and, if there is a further development of trade, only at lower and unprofitable rates."

The Babcock & Wilcox Company, of New York City, have patented a boiler furnace in which the contact of the gases with the surface of the boiler is retarded until they have per-

fectured their combustion. The spaces between the front section of the boiler tubes are filled up with fire-clay bricks. These bricks are made hollow, and are of oblong shape, their longitudinal edges being curved to fit the tubes between which they rest. In the sides or back or in the front wall of the furnace there are small openings to admit air that is to mix with the gases which rise from the fuel. The rising gases pass up through flue-like spaces left between the rows of tubes, and flow around a baffle plate and down through the succeeding section in the usual way. In their passage through the flues, combustion takes place and the temperature of the bricks is raised to a high point. The gases generated by the burning of fresh fuel are, after admixture with air, highly heated in passing through the flues. Thus ignition takes place and complete combustion is effected by the time the gases reach the top of the section, and before they come in contact with the bare water tubes in the succeeding section.

Regan's Metallic Shingle.

Another form of metallic shingle is being introduced to the trade by the Cincinnati Stamping Company, southeast corner of Pearl and Lawrence streets, Cincinnati, Ohio,



Regan's Metallic Shingle.—Fig. 1.

and is illustrated herewith. The shingle is rectangular in its general form and has imparted to it in the process of stamping an ornamental figure, as shown in the cut. Its distinguishing feature, comparing it with other shingles, is the side joint by which two adjacent shingles are locked together. By referring to the enlarged section in Fig. 3 of



Fig. 2.—Section Through Single Edge.

the accompanying engravings, the nature of the joint will be understood. It will be seen that in the process of forming the edge of the shingle is creased and doubled over upon itself, and then afterward made to form a rib with an outside flange which answers for nailing. The adjacent shingle has formed upon its side a rib with a narrow projecting edge which engages in the socket or crease



Fig. 3.—Section Through Double Edge.

formed in the first. In laying the shingles they are fastened to the sheeting boards by nailing through the flange first described, after which the second shingle is hooked in place, as shown in the engraving. By this means a water-tight joint is made, the nail-heads are covered, and ample provision made for contraction and expansion. The company announce that these shingles are sent out handsomely japanned on both sides in red, green and blue colors. They are packed one square to the box. Three sizes are manufactured, namely, 7 x 10, 10 x 14 and 14 x 20. The engraving very clearly indicates the provisions that are made for securing proper lap between adjacent longitudinal courses, and also how joints are broken.

Melting and Boiling Points.—Prof. F. Carnelly, of Dundee, Scotland, has just issued the first part of the results of investigations upon which he has been engaged for many years, in the shape of a volume of tables of the melting and boiling points of all elementary substances, all inorganic compounds and all organic compounds which do not contain more than three elements. This first volume contains 352 folio pages and nearly 19,000 separate melting and boiling point data. A second volume, which is in progress, will raise the number of separate data to about 50,000, and, besides including the organic compounds of more than three elements, will give also a number of miscellaneous facts referring to melting and boiling, such as complete tables of vapor tensions at different temperatures, and of boiling points at different pressures, for a considerable number of substances, the boiling points of saline solutions, the freezing points of cryohydrates, &c., and an extensive series of bibliographical references. The present volume is manifestly the result of enormous labor, and promises to be of great value as a book of reference for persons engaged in chemical research.

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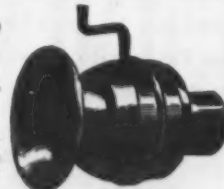
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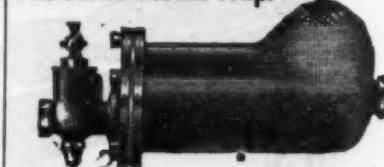
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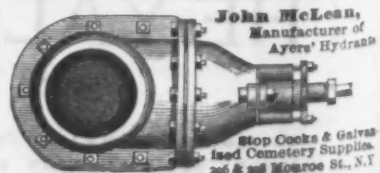
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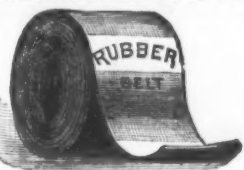
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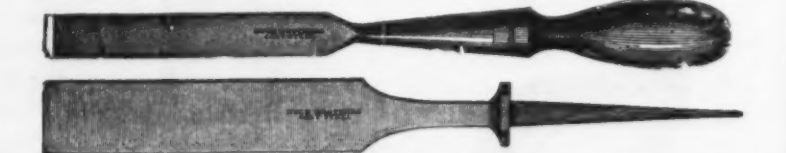
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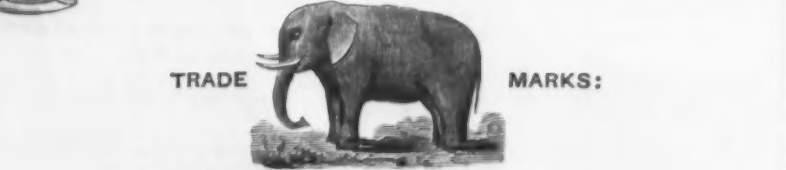
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An Iron Cement.

Usually certain proportions of pulverized sal ammoniac in crystals, sulphur, iron filings or drillings, and urine or water, has been deemed as quick and adhesive a cement for two iron surfaces as any that could be made. But this mixture sets slowly and requires days or weeks to get in its perfect work. The object of this cement is to oxidize the surfaces of the iron, so that close contact will unite the rust, and thus hold the two surfaces as one. Natural specimens of oxidizing of iron as cement are not uncommon. Almost all specimens of bog iron ore show aggregations of iron by rust, sometimes quite large masses being held in one firm embrace by this means; the writer saw in Nova Scotia lumps of bog iron ore aggregated by rust so that there was a conglomerate globe of separate globes of at least 30 inches diameter. In fact, the "rusting" of joints is an old trick with mechanics. But in place of sal ammoniac let the jointer use chloride of lime, one of the common disinfectants, and the fixity of the joint will surprise him. Two joints of 3-inch cast-iron pipe, with flanges sufficiently wide to take in 1/4-inch bolts, were secured with a mixture (in the usual proportions) of cast-iron filings, water and chloride of lime. The actual proportions were: Fine filings, 10 parts; chloride of lime, 3 parts; water, enough to mix to a paste. These joints were bolted together after the mixture was placed between them, and, after being left one night, when broken apart the cement scaled off a portion of the solid iron of one of the flanges. This cement has stood the action of 60 pounds of steam in a pipe connection to a steam boiler where rubber glands and canvas and white lead failed.

A New Electric Battery.

From a report in the *Engineer*, we learn that at the International Inventions Exhibition, Mr. J. A. Kendall, of North Ormsby, Middlesex, exhibits an electric battery which appears to be a decided step in the direction of producing electricity from the oxidation of coal without the intervention of a steam engine. The battery is based upon the well-known phenomenon of hydrogen passing through platinum at a red-heat, two platinum plates being used as the poles, one exposed to hydrogen and the other to oxygen. These plates are arranged in the form of concentric tubes closed at one end, and are separated by a fluid medium of fused glass. Hydrogen gas is continuously supplied to the inner platinum tube, while the entire apparatus is maintained at a high temperature by means of a furnace fed with coke or liquid or gaseous fuel. The absorption of hydrogen by the platinum is accompanied by electric generation, and the current is led away by wires connected with the platinum tubes. It is curious, however, that, so long as the two platinum tubes are not connected by a metallic circuit, the passage of the hydrogen is slow; but that, as soon as the electric circuit is completed, the rate of flow is suddenly increased and steadily maintained at the higher amount. In the case of a group of cells or battery the same gas furnace may be used to heat the series. The cells are connected for quantity and intensity, as in the voltaic battery. The electromotive force of a cell is given by Mr. Kendall as about 0.7 volt. This is, of course, much less than the theoretical electromotive force of a hydrogen and oxygen couple, and the remaining energy evolved by the combination appears to be developed in the form of heat at the surface of the oxygen plate, and serves to keep up the temperature of the apparatus. In the action of the battery, the hydrogen in passing through the inner tube is, so to speak, filtered off from any gases with which it may be mixed. The residual combustible gases, if any, when drawn off by the escape jet, can be utilized as fuel for the furnace. This is a very valuable feature, as it enables the battery to be worked with Strong producer gas, consisting mainly of hydrogen and carbonic acid, and to be arranged in a very compact way, the spare heat left from heating the cells being available for working the producer. Mr. Kendall proposes to employ it for a variety of purposes—for example, the driving of electric launches, and so on. With the new generator, all that is required to maintain the working is a supply of fuel and a little water. The inventor estimates that a ton of coke used in heating the battery, including the hydrogen producer, will give at least three times the electrical energy that would be produced by the same quantity of coke used in working a steam engine and dynamo. It is also hoped by the inventor to

develop the new process of electric generation for lighting purposes. Houses can in this way be lighted by incandescent lamps by means of coal gas supplied to the premises, and larger centers of illumination could be economically worked by the use of ordinary fuel, such as coal and coke.

The Ehrenberg-Montaudon Telemeter.

Lieutenant von Ehrenberg, an officer in the Baden Artillery, has invented a watch for estimating distances by sight and sound, and has had an instrument of the sort constructed according to his design. The watch is not too large for the pocket, with mechanism of such a sort that, as in the case of ordinary chronographs, the indicating finger returns automatically to zero after each observation. To insure simplicity and accuracy of observation the dial is divided into hectometers. Now sound, as is well known, travels at the rate of 334 m. a second, and the finger of the telemeter marks distances up to 10 km. by fractions of 50 m., and this is all that is required for observation in the field of battle. By pressing the winding-up stud at the moment the observer perceives the flash of a hostile cannon or a rifle the finger begins to move. A second quick pressure when the report is heard indicates the distance desired within 25 m. A third touch brings the finger back to zero. The telemeter has been improved by Major Montaudon, and is arranged in four divisions. The first gives the hours and minutes; the second, the seconds; the third constitutes the telemeter, properly so called, and indicates fifths of seconds, and the fourth gives the distances in hectometers and demi-hectometers. According to experiments made not long ago at Thun, the variation in judging distances by the telemeter during calm weather does not exceed 50 m., and this for all practical purposes is sufficiently close. During some recent maneuvers of a division of the Swiss army in the Grisons, an artillery officer made several interesting experiments with the instrument. Finding it impossible during a sham fight—owing to the configuration of the country—to judge distances by the map with sufficient accuracy, he succeeded in doing so with the help of the telemeter. The same at Ragatz, where, the position of the mountain guns of the enemy being masked by trees, nothing could be seen but the smoke. At the beginning of every action it was found easy to determine the distance of lines of infantry, and equally so after every pause in the combat. Infantry fire could be observed just as well as gun fire, and Herr Krupp is so well satisfied with certain experiments he caused to be tried that he has ordered a considerable number of these telemeters.

Utilizing Solar Heat.

A Frenchman, Ch. Tellier, has described in *La Nature* an ingenious apparatus designed by him to utilize solar heat as a power for raising water from a well. He has roofed a shed with southern exposure with a number of plates bent, and riveted until they form boxes containing a thin stratum of a volatile liquid. Every box, which is provided with a pipe at its upper end, thus practically forms a very flat still. The liquid employed is a solution of ammonia, which, under the action of the sun's rays, distills over into the individual tubes of the roofing boxes, these tubes being united with one general pipe which leads to a receiver. The vapors, being under pressure ranging from 15 to 45 pounds, are conducted to a hollow sphere placed in the well from which the water is to be raised. This sphere contains a rubber diaphragm. When the pressure of the ammonia gas acts upon this diaphragm it forces it downward, forcing out the water under it. When the sphere is emptied it is necessary, in order to repeat the operation, that the diaphragm be returned to its original position by condensing the ammonia. This is effected in the following manner: In the center of the diaphragm is inserted a float carrying a rod working a slide-valve. One of the ports of this valve corresponds with the gas-supply pipe, the other with the exhaust. The latter is opened when the diaphragm has been forced to its lower position. The exhaust ammonia is carried through a worm of pipe in an air-tight vessel filled with dilute ammonia. An apparatus like the one described has been at work at Auteuil, where, with 10 box shingles, it raises 1200 liters, or 1267 quarts, of water per hour from a well 66 feet deep.

In the National Convention of Miners at Indianapolis, held recently, resolutions were adopted favoring the total abolition of the system of contracting for convict labor when it is brought into competition with free labor; the adoption of two weeks' pay and the abolition of the truck system in all its forms. A general suspension of the mining of coal in the United States and Territories for one week at a date as early as possible was approved. A recommendation was adopted to the effect that, on all general questions arising within the jurisdiction of the association, ten days' notice be given by the miners, provided operators grant the same courtesy to them. The principles of arbitration were favored in preference to strikes, and, following this, a resolution to abolish the free-turn system in all the States and Territories was adopted. The powers and duties of the Executive Board, which is to be the governing body of the organization, were defined, and it was decided that revenue should be raised by a monthly assessment of 1 cent on each member of the union and 25 cents dues from each, to be collected this year before November 1. An address to the miners of the United States was adopted setting forth the objects of the federation. The following board at large were elected: Chris. Evans, of Ohio, executive secretary, who is also to exercise the powers and duties of president; Daniel McLaughlin, of Illinois, treasurer; J. J. Sullivan, of Iowa; John H. Leavis, of Pennsylvania; I. B. Fleming, of West Virginia. The members of the Executive Board representing the several States were as follows: Illinois, David Ross; Ohio, John McBride; Indiana, Patrick McAdams; West Virginia, T. P. Gray; Iowa, David Reed; Kansas, James Smith; Pennsylvania, Geo. Harris.

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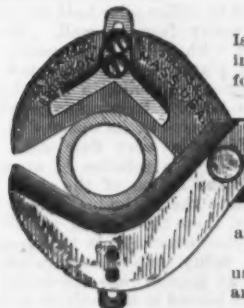
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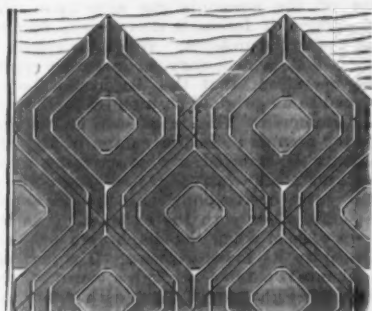
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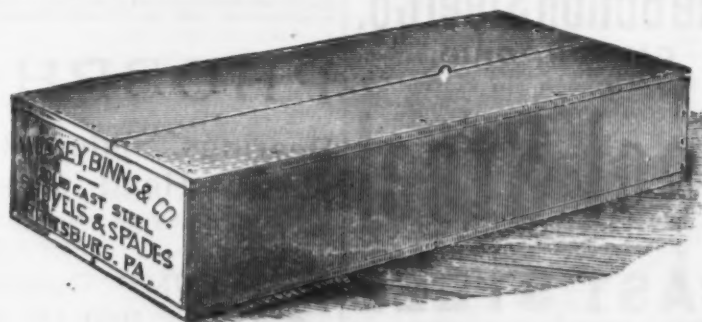
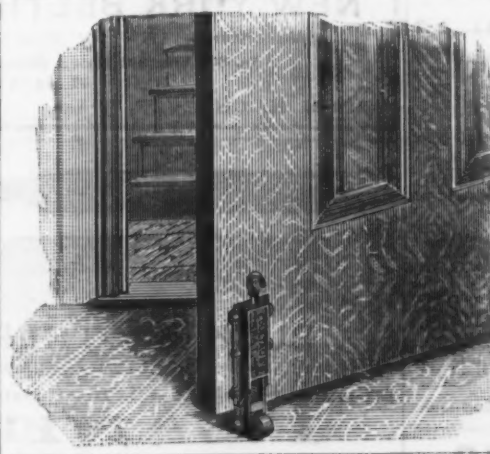
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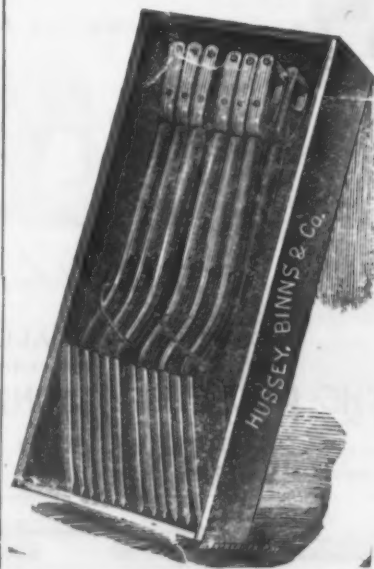
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The Manufacture of Steel Castings.*

BY P. G. SALOM, PHILADELPHIA, PA.

The manufacture of steel castings has become one of the important industries of the times. The late Mr. Alexander L. Holley published in 1878, in the *Metallurgical Review*, an able paper, entitled "Solid Steel Castings," showing how all manner of castings could be made advantageously of steel. Mr. Holley had then but lately returned from the great iron and steel works of Terrenoire, France, which were engaged, I believe, almost exclusively on large castings of a simple type for the Government, and were repeating the same operation from day to day. These conditions are, as experience has shown, very different from those of ordinary practice in miscellaneous castings; and Mr. Holley might have been less confident if he had actually gone into the business. More than seven years have passed, and as yet the magnificent possibilities held forth in his paper have not been realized. There are only six steel-casting establishments in the United States, and their total output of castings is certainly not as much as 20,000 tons per annum, and probably not more than 10,000 tons, whereas it should be over 200,000 tons to supply the needs of the country.

A large number of so-called steel castings are made, however, which are nothing more than malleable iron. The best of these castings are made from a superior white pig, as low in silicon and phosphorus as possible. They are made in the same manner as ordinary iron castings, except that the metal, having so little silicon, chills much quicker than ordinary No. 1 foundry iron, and the liability to shrinkage-cracks renders it necessary to put large "rising heads" on the castings. The castings, after cooling, are very hard and almost as brittle as glass, and are, or should be preferably, perfectly white throughout. They are then annealed in ore or scale, to which a little sal ammoniac has been added. This latter operation, which requires about two weeks, produces on the entire surface of the casting a coating of malleable iron, about $\frac{1}{4}$ inch thick, and renders the inside sufficiently soft to be tooled without any difficulty. For small castings such a metal is admirably adapted; but castings several inches thick made in this way are only slightly superior to good pig iron in having perhaps a little greater tensile strength. What, then, are the reasons, in view of what has been said above, for such a small production of genuine steel castings? This question is best answered by a short description of the three general methods employed in the manufacture of steel castings, viz., the crucible, the Bessemer and the open-hearth processes.

Crucible Steel Castings.—I have no hesitation in saying, and say it without fear of contradiction, that crucible steel castings are a failure and always will be. I do not mean by this statement to say that it is impossible to make crucible steel castings satisfactory. But with the single exception of a particular class of work where hardness and ultimate strength are alone desired (for which requirements they are well adapted), there are always a number of disturbing elements that will eventually result in the total disuse of crucible castings. The value of small steel castings depends on the possession of qualities that render them equal or superior to forgings. When it is attempted to make a steel with the requisite qualities the troubles begin. First, in order to get such a steel, much bar must be used almost exclusively. This, as every one knows, is very difficult to melt in a crucible furnace, and, after melting, it is almost impossible to pour it, as the metal chills before the pots can be emptied. If, however, after unusual exertions, a successful cast be made, the castings are found to be full of blow-holes. There are two means employed to remedy the latter defect—first, by the use of ferrosilicon, and, second, by making a steel higher in carbon, and therefore more fusible. When sufficient ferrosilicon is added to give from 0.5 to 1.0 of silicon in the steel, the metal is not difficult to melt; but the resulting castings, while soft and solid, have lost all their ductility and are simply a superior form of pig iron, with a tensile strength of about 50,000 pounds. If, on the other hand, the pots are charged with stock higher in carbon and only a small percentage of ferrosilicon is added, the castings are solid, but are brittle, and so hard as to be difficult to tool. Their hardness is extremely objectionable to machinists, but their brittleness is a still greater evil and precludes the possibility of their replacing forgings. It has been attempted to overcome the latter difficulty by annealing, and by this means a really superior crucible casting can be made. But the additional cost of production is greater than consumers are willing to pay for the castings.

Bessemer Steel Castings.—The application of the Bessemer process to the manufacture of steel castings in this country was first made by Mr. Hainsworth, of the Pittsburgh Steel Casting Company, who has achieved a more notable success in steel castings than perhaps any other man in the United States. The Bessemer process, however, in the manufacture of steel castings, is as yet open to the objection of making a less homogeneous and a harder metal than the open-hearth. Some months ago I saw a number of large Bessemer steel cranks, weighing from 7000 to 8000 pounds each, that had broken in half when it was attempted to shrink them on the shafts for which they were intended. A number of open-hearth cast-steel cranks of the same size, made at the Chester Rolling Mills in 1882, easily withstood the shrinkage test and are still in service. Notwithstanding the failures in this respect, which have greatly prejudiced consumers and prevented thus far a more general adoption of steel castings, I believe that in a few more years all steel castings will be made by the Bessemer or an equivalent pneumatic process.

Open-Hearth Steel Castings.—I am glad to be able to say positively that this method can now be relied upon to make a very large class of important castings with entire success. Mr. Holley has given such a thorough and admirable description of this process that I cannot refrain from quoting it in part,

omitting details, after which I will confine my remarks to some of the difficulties that a practical study of the subject has developed, and to the chemical and physical qualities of the castings. Mr. Holley says: *

"The operation consists: 1. In the formation of an initial bath of manganiferous pig to prevent oxidation during the process. 2. In dissolving such softening or decarbonizing materials as wrought iron in this bath. 3. In the addition, at the end of the operation, of silicon and manganese in such order and proportion as to prevent the formation of blow-holes while casting, and at the same time give to the steel certain special physical qualities.

"Another very important feature of the process is the method of taking tests. We will now describe in detail the different stages of the operation, and we will suppose at first, so as to avoid confusion, that the metal to be produced is of the harder kind.

"**The Furnace.**—The object of greatest importance during the whole of the operation is to keep oxidation as low as possible in the bath. For this reason the furnace must, indeed, be kept as hot as possible, with a good solid body of flame; but there should be only just enough air admitted to promote thorough combustion.

"**The Initial Bath.**—This must be made of pig iron containing from 6 to 9 per cent. of manganese. Spiegeleisen is probably the most convenient form of pig; but, as spiegel with this percentage may not be at hand at all times, the bath may be formed by taking a richer spiegel, say 12 or 14 per cent. manganese, and diluting it with one-half ordinary pig containing no manganese. The weight of the initial bath, in proportion to that of the whole charge, varies according to the conditions under which the heat is made. We may say, generally, that 11 per cent. of the whole is an average quantity. Every open-hearth melter knows that it is impossible to determine in advance the exact quantity of pig wanted for the operation. The temperature of the furnace has much to do with it. The nature of the refining material has also a great influence. If a specially pure product is required and the softening materials used are very fine puddled blooms, nearly free from carbon and manganese, the initial bath must necessarily be larger, as well as richer in manganese; it may in this case reach 14 per cent. of the whole charge. The materials for the initial bath are always charged cold.

"**The Softening or Refining Materials.**—Soon after the bath is completely melted the refining materials are successively added in small lots of about 450 pounds each. These are invariably preheated, as charging them cold and frequently would tend to keep down the temperature of the bath. *

"The materials used in this second period of the operation are chosen with reference to the quality required in the finished product. They may be good Bessemer open-hearth scrap, foundries from previous castings, puddled bars or direct blooms. Materials inferior to these would correspondingly lower the quality of the product. *

"The proportion of refining materials to the whole charge averages 75 per cent. *

"**Slag Tests.**—Spiegeleisen is used for the initial bath, because the manganese it contains, being the most oxidizable of all the materials present, will remove oxygen that may be present in the bath, and will intercept oxygen that tends to enter it; so that the more manganese there is in the slag the less oxygen there will be in the metal below. Oxide of iron tends to make the slag black; manganese turns it light olive or ash green, and the different tints between these two extremes give to the practiced eye an exact idea of the state of the oxidation of the bath. *

"**Metal Tests Before the Final Additions.**—The slag test gives no indication of the physical state of the metal, which is an equally important guide in the operation. When, therefore, the operator has reason to believe that the metal is approaching the point of sufficient softening or purification, he makes the following tests: A ladleful of metal is taken from the furnace and cast into a round ingot about 3 inches in diameter and $1\frac{1}{4}$ inches thick. The ingot is knocked out of the mold as soon as set, and flattened under a special steam hammer, at its original heat, into a disk about 7 inches in diameter and $\frac{3}{4}$ inch thick. *

From bending and fracturing these disks the operator can judge of the state of his metal with great nicety, and has at hand all the necessary elements to remedy any unfavorable tendency likely to develop during the operation. *

"**The Final Additions.**—These consist of a special pig containing both silicon and manganese, and also an additional quantity of manganese introduced in the shape of a 50 or 60 per cent. Mn ferromanganese. A part of these ingredients is taken up by reactions which prevent the formation of blow-holes; the remainder is left in the metal to impart to it certain physical qualities. The usual charge consists of 11 per cent. of special pig having the following composition:

Mn.....	3.50
C.....	3.00
Si.....	4.20 to 4.60
P.....	0.10

" * * * The proportion of ferromanganese used varies from 1 to 1.8 per cent. of the total charge. *

"The special pig is charged hot. While it is melting a marked change takes place; the bath which up to that time had bubbled about as much as in the ordinary pig and scrap operation becomes gradually more and more quiet until its surface is smooth and scarcely broken by small and widely-scattered bubbles. When the special pig is nearly all melted the ferromanganese is thrown in hot. The bath is then rabbled vigorously for about a minute, and casting takes place immediately."

The Standard Steel Casting Company, Thurlow, Pa., of which the writer was lately president, found it possible in practice to simplify many points in the above method, securing equally good results. None of the stock is preheated except the final additions,

* Solid Steel Castings for Ordnance, Structures and General Machinery by the Terrenoire Process. By A. L. Holley, C. E. (Reprint from the *Metallurgical Review*, New York, 1878, vol. II., p. 265).

* Read at the Chattanooga meeting, May, 1885.

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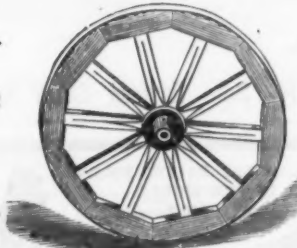
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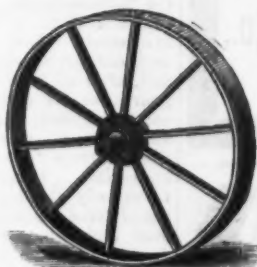
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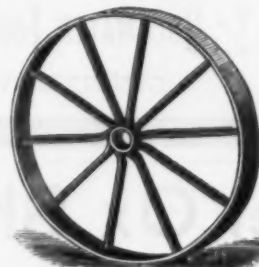
It has *TEN* spokes of thoroughly seasoned wood, and each spoke is supplied with a separate felloe. The hub is of chill cast iron, and riveted firmly to the spokes, which are so cut as to counterbrace each other. The spokes are keyed from the center after the tire is shrunk on. *This wheel will not shrink or give in any weather or climate, and the tire cannot become loosened.* An oil hole is drilled into the hollow washer of the hub, and the oil distributes itself along the bearings while the wheel is in motion. The wheel revolves on a fixed shaft or axle, which passes through the end of the handle, and is a brace to the barrow. This wheel cannot be broken or weakened by ordinary usage, and will last a lifetime. It is well painted. *We guarantee it superior to any other WOOD WHEEL.*

JACOBS' PATENT STEEL SPOKE WHEELS.



Wheel Complete.

Wrought-Iron Tire. Steel Spokes.



Without Hub—Showing Construction.

These wheels are so constructed—having spokes tightened from center—that the tire cannot come off or the spokes become loosened. Hubs hardened on inside. Oil hole in hub. Diameter of wheel, 17 inches. Wrought-iron tire, 1 1/2 inches wide. *Steel spokes. The Best Barrow Wheel Manufactured.*



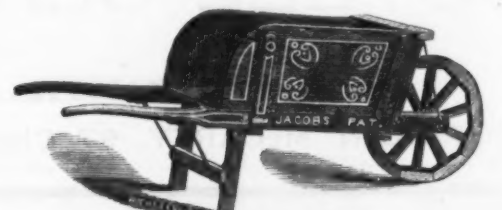
The above cut shows the manner in which our *Railroad, Ore, Wharf and Steel Tray Barrows* are packed for shipment. This insures lowest rate of freight, and they can be quickly and easily set up by following the simple instructions sent with each half-dozen Barrows. In this shape Barrows require much less room for storage, and can be as easily set up as if received with Tray fastened to Frame.



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The Tray is stamped from *one solid plate of steel*. Steel Spoke Wheels 17 inches in diameter. Wrought-Iron Tire, 1 1/2 inches wide. These Barrows, while much lighter than those having iron frames, are *equally strong* for all practical purposes, and will stand the roughest usage. Two sizes. No. 1, capacity 3 1/2 cubic feet, for Earth, Sand, Ore and Foundry use. No. 2, capacity 5 cubic feet, for Coal, Manure, Sawdust, Ashes, &c. Pack for shipment same as R. R. Barrow.

We make three sizes of these Scrapers. No. 1, capacity, 7 cubic feet of earth. No. 2, 5 cubic feet of earth. No. 3, 3 1/2 cubic feet of earth. Furnished with or without *solid steel shoes or runners*, as desired. The bails are of refined iron, with strong and perfect working swivels. Bowls nest and handles crate compactly for shipment.



GARDEN OR FARM BARROW.

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Double Frames and so constructed that by simply removing one bolt (the axle) and two nuts they can be folded flat down (see cut) and shipped at lowest rate of freight. Three sizes.



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STRAIGHT HANDLE STONE BARROW.

With Jacobs' Patent Wheel. Strong, well-made, iron strapped over bottom and bolted together. For stone or pig iron, &c.



BENT HANDLE STONE BARROW.

With Jacobs' Patent Wheel. 17 1/4-inch tire. Well ironed and bolted. Extra strong.



STEEL BOTTOM STONE BARROW.

Bottom and Dash formed of *one plate of steel, one-fourth of an inch thick*. Steel Spoke Wheel. The strongest and best Stone Barrow manufactured. Very durable.



THE AUTOMATIC REVOLVING ROAD SCRAPER.

Three sizes. 30, 33 and 36 inch. Both Steel and Wooden Bottom.



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With Jacobs' Patent Wood Wheel. Bent Tray, full sized, planed and well finished.



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Same as above, except with Jacobs' Patent Steel Spoke Wheel.



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With Jacobs' Patent Wood Wheel. All hardwood. Bowl dovetailed together and firmly nailed.



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With Jacobs' Patent Wood Wheel. Folds for shipping same as Garden or Farm Barrow.



TIGHT BOTTOM BRICK BARROW.

Same as above except having Closed Bottom. We furnish either style of these Barrows with *Steel Spoke Wheel* when specially ordered.



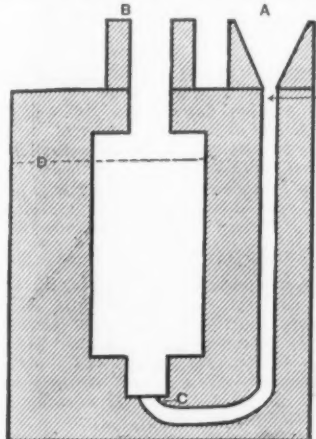
WOOD OR BARK BARROW.

Wheel same as above. Body and Dash strapped with heavy iron. Well finished. For Wood, Bark, Bales, Boxes, &c.

and the refining materials are charged at once. The two principal difficulties that the steel foundryman has to contend with are blow-holes and shrinkage.

Blow-Holes.—It is commonly supposed that blow-holes in castings are due to carbonic acid gas disengaged during the operation of casting. This is only true to a very limited extent, especially where the steel contains 0.1 per cent. or more of silicon. Herein lies the cause of the many failures connected with the manufacture of steel castings. The manufacturers had been led to believe that it was only necessary to add a few pounds of ferrosilicon to their steel, and presto! all the castings would be solid. Practical experience has proved the fallacy of this idea. Blow-holes in steel which has been properly melted, and to which has been added sufficient ferrosilicon, are almost entirely due to the high melting point of low-carbon steel, or rather to the rapidity with which the metal chills. This is proved by the fact that the lower ends of castings which have been fed from the bottom by means of a runner are always solid, while the blow-holes, when such exist, are always on top. Out of the thousands of castings we have made, I have never yet seen a single one with blow-holes where the gate joined the casting. The metal does not remain fluid long enough to allow the air and other gases that are mechanically carried into the mold to escape.

This is best illustrated by reference to the accompanying sketch, Fig. 1, which represents the manner of casting a plain roll. A is the fountain-head or basin where the metal passes from the ladle into the mold;



Manufacture of Steel Castings.—Fig. 1.—Mold for Casting a Plain Roll.

B, the rising-head; C, the point where the runner joins the roll; D, the point where the casting is liable to defects from blow-holes. The reason for this is obvious. If water from a faucet passes through a tube it carries the air along with it. If we could instantly congeal the water, the resulting ice would be full of holes. So it is with steel, only more so, since the molten metal is not nearly as fluid as water. As a consequence of the metal meeting the relatively cold mold, by the time the metal reaches the top of the mold it is very much less fluid, in fact, almost pasty, against the sides, and solidifies instantly without further provocation. If there are any corners, the air is confined in them, and in its efforts to escape through the pastry mass, furnishes (as a cooling agent) the last requisite necessary to solidify the metal. The air is thus imprisoned, and the casting defective. What is necessary, therefore, for a perfect casting in the above case—or, indeed, in any case—is a free circulation of the metal. If the mold can be obtained full of fluid metal, the resulting casting will be solid—that is, free from blow-holes. It may have a hole in the center due to shrinkage, but such holes are entirely distinct from blow-holes, as will be explained below, when I come to speak of shrinkage. The difficulty connected with blow-holes, as will be seen by an inspection of the 2000 pound cast-steel roll before you, we have almost entirely overcome by putting on top of the casting a rising head from 2 to 3 feet high. By this means we have been able to make 6000-pound steel rolls without a single blow-hole or flaw of any kind, and now we rarely lose a casting of this simple type. The long riser is effective in two ways—first, it carries from the casting proper the sluggish metal which has been cooled in its passage through the mold, and allows the mold to be filled with hot fluid metal; and, second, the ferrostatic

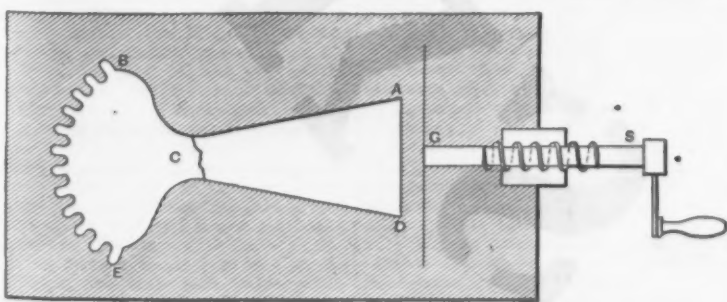


Fig. 2.—Sectional Plan, Showing Screw Arrangement to Prevent Shrinkage Cracks.

pressure of a column of iron 3 feet high is equal to about 10 pounds to the square inch. This pressure has a tendency, of course, to force the metal into all the corners and make it solid. It also prevents in a measure shrinkage troubles, and appears to give to steel castings that solidity for which they are noted, giving them a density of 7.8, almost equal to that of a forging.

Shrinkage.—The second serious trouble encountered by the steel foundryman is shrinkage. This presents a difficult and troublesome problem, which has not as yet been fully solved. It is almost impossible to make certain large, thin, complicated castings of steel. Shrinkage troubles are caused by the immense contraction of cast steel, which frequently amounts to $\frac{1}{4}$ inch per foot, and to the hard, dry sand molds which it is necessary to use in order to prevent the

white-hot metal from destroying the mold. There are five different ways of attempting to remedy this evil: 1. By changing the chemical constitution of the steel. 2. By stripping the castings as soon as poured. 3. By mechanical pressure. 4. By large rising-heads. 5. By care in molding.

Chemical Constitution.—A change in the chemical constitution, by increasing the manganese and diminishing the silicon, will nearly always have the desired effect. This renders the metal more fluid and lowers its melting point.

Stripping.—A large number of castings can be saved from tearing apart or cracking when cooling by simply opening the flasks immediately after pouring, and covering the casting with sand.

Mechanical Pressure.—We have been able to save quite a number of difficult castings by means of mechanical pressure. For example, at one end of a flask, and immediately at the end of the molding, a small iron plate is placed. This plate is attached to a screw which can be turned from the outside of the flask. The arrangement is admirably adapted for castings large at both ends and small in the middle. Suppose, for example, we have a long lever gear casting to make, such as is sometimes used for hay or cotton presses. In such a case the shrinkage is away from the center in both directions, as will be seen by reference to Fig. 2. In this figure, which presents a sectional plan of the mold containing such a casting poured "on the flat," A D is prevented from drawing toward B E by the hard sand between, and, as a consequence, the casting is apt to break in two at C. By forcing the iron plate G against A D by means of the screw S, the sand is broken and allows the casting to contract without straining or cracking it.

Rising-Head.—A large rising-head prevents shrinkage-cracks by the pressure it exerts and by feeding the metal to points where shrinkage is taking place.

Molding.—Many castings can be saved from shrinkage-cracks by an intelligent molder. It would be useless for me to enter into details on this subject. Suffice it to say that every pattern is a study; and it is only by an intelligent application of the knowledge already gained that it is possible now to make castings that a few months ago it would have seemed ridiculous to attempt.

Shrinkage-Holes.—Shrinkage holes in castings are exactly similar to the phenomenon called "piping" in crucible steel. They are very troublesome and difficult to prevent, although they rarely affect the value of a casting, coming as they do in the center. They are caused, of course, by the metal chilling before the immense shrinkage occurs. Then when this contraction does take place on all sides, but away from the center, there is no more fluid metal to run into the space thus made vacant.

Physical and Chemical Properties.—The most important chemical difference between cast steel for castings and ordinary open-hearth or Bessemer steel is in the amounts of silicon they contain. Many eminent authorities maintain that silicon is a hardener, and increases, therefore, the tensile strength, like carbon (although in a lesser degree); but I have not found this to be the case in my experiments. On the contrary, I have always found it to diminish the tensile strength, and when above 0.5 per cent. to destroy almost entirely the elongation or ductility, making the metal very red-short and brittle when cold. It may have been that the silicon in the steel that we tested was present as silicic acid, but this could hardly be the case in samples made by the crucible process in black-lead pots. Such steel made from the best Bessemer muck bar, to which had been added sufficient ferrosilicon to make over 0.5 per cent. of silicon in the steel, only showed a tensile strength of from 40,000 to 50,000 pounds per square inch in perfectly solid test bars, whereas the same mixture with less silicon (but higher manganese, however) invariably gave higher tensile strength. The only explanation that I can suggest which will at all account for the exactly opposite conclusions of the above-mentioned eminent authorities is that it is probable that silicon exists in steel both as combined and as graphitoid silicon. In the former case it might act like combined carbon and be a hardener; in the latter it would act like graphite, and undoubtedly would be at least indirectly—or, so to speak, negatively—a softener.

Another important difference is the comparative wide limits between which the carbon, silicon and manganese may vary in castings without affecting to an important degree the physical results. Such wide variations in steel rails or plates are now quite unknown. The influence of carbon on steel

+ 45,000 = 75,000 pounds, or about the tensile strength of rail steel. Again, crucible steel contains from 0.50 to 0.85 carbon, from which numbers we get in the same way 95,000 and 130,000 pounds respectively, which include the range of tensile strength of various kinds of tool steel. Still again, a sample of spring steel showed 1.0 carbon; its tensile strength should therefore be 145,000 pounds. Its actual tensile strength, as tested at Altoona, was 143,000 pounds.

Of course this law only holds good where other things are equal. An undue amount of one or all of the other foreign substances that enter into the composition of steel, or unusual physical conditions, would change the results entirely. It may be of value, however, as an indication that, when steel with a known amount of carbon does not possess a certain tensile strength, then the other substances entering into its composition are present in undue proportion, or it must have been made under unusual physical conditions. The above law is not applicable to castings, where the presence of

were able to retain this ductility to its greatest possible extent, a casting would be of far greater value than a forging. This can be secured by compression or by no-silicon steel, if consumers could be educated to use steel with blow-holes. A case in point is the forged-steel shaft of the Dolphin. A shaft cast to its shape under compression would never have broken under the same test. Even an ordinary steel casting would have been far superior to that shaft, for the metal would at least have been solid and free from that spongy unworked condition due to heating up and cooling down, and to the insufficient power of the hammer to properly work the metal.

There is a popular fallacy in this country that steel castings can be made in England and on the Continent without any trouble from blow-holes. But the *Mechanical World* of February 7th, 1884, speaking of Mr. Alfred Davy's process, says: "If Mr. Davy opens up to iron foundries a means of making either steel or iron castings with little more than iron-foundry plant, he will confer

Syracuse, N. Y., Bradley & Co.
Harrisburg, Pennsylvania Steel Company.
Johnstown, Pa., Cambria Iron Company.
Pittsburgh, Carnegie Bros. & Co.
McKeesport, Pa., National Tube Works Company.

Chicago, Fraser & Chalmers.
Milwaukee, E. P. Allis & Co.
Denver, James Jackson.
San Francisco, Baker & Hamilton.

Mr. Salom further says: "Some months ago I saw a number of large Bessemer steel cranks, weighing from 7000 to 8000 pounds each, that had been broken in half when it was attempted to shrink them on the shafts for which they were intended. A number of open-hearth cast-steel cranks of the same size, made at the Chester Rolling Mills in 1882, easily withstood the shrinkage test, and are still in service." Mr. Salom, mentioning my name in connection with steel castings, and then referring to the broken cranks made under my supervision, prompted me to say that I feel sorry to have to mention the name of Jno. Roach & Son in con-

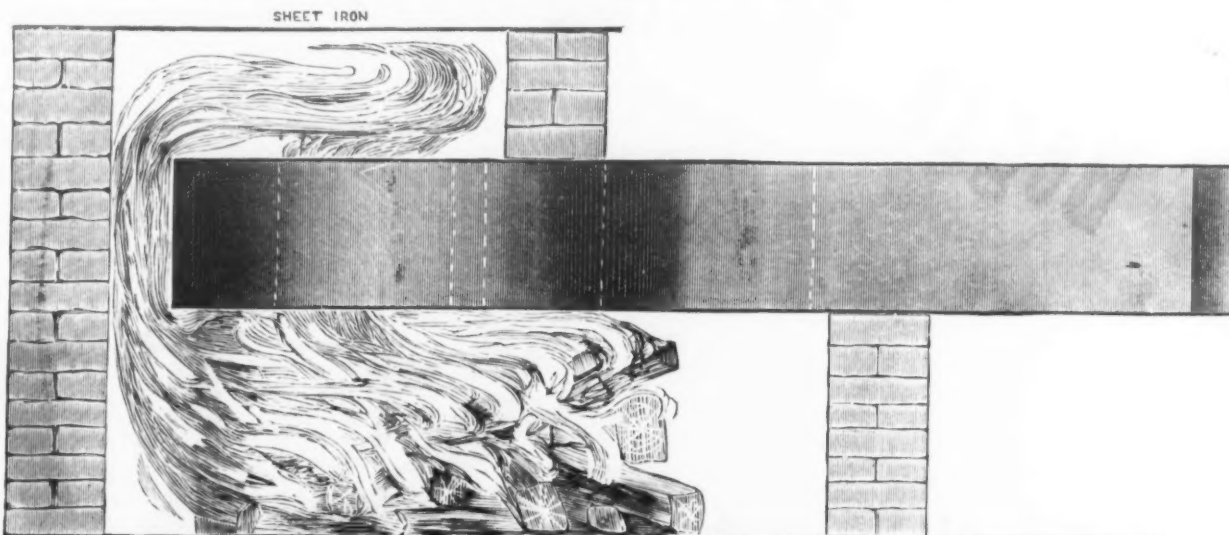


Fig. 3.—Heating the Crank in a Wood Fire Preparatory to Shrinking on Shaft.

so much silicon affects in a notable degree the tensile strength derived from a given amount of carbon, and the physical properties are also affected by the fact that the metal has not been worked. Manganese plays an exceedingly important and valuable part in the manufacture of steel castings. Low-carbon steel, to which has been added about 0.3 per cent. of silicon, is very pasty, and can be poured without chilling into the largest castings only. Manganese will correct this trouble to a great extent, although somewhat at the expense of softness and ductility. The castings, however, as we have seen above, are more apt to be solid and less liable to crack in the molds, the metal being much less red-short. We must remember, in studying the physical characteristics of steel castings, that we are

a benefit on the engineering profession. Perhaps he can also show the users of his patents how to make sound steel castings. If so, much will have been done, for those much to be desired articles are yet a rarity even in the most advanced establishments." The Standard Steel Casting Company have been unusually successful with large castings. Their works have made a greater technical success, in a shorter time (the open-hearth furnace having been in operation only nine months), perhaps, than any steel foundry that has ever been established. They have recently executed an order from the Edge Moor Iron Company, of Wilmington, Del., for a cast-steel housing for a hydraulic upsetting machine. The casting, when finished, weighed a little over 27,000 pounds, and is undoubtedly the largest

nection with this unfortunate crank affair. I wish to say in all respect to Mr. Roach that, from the several interviews I had with the gentleman, I concluded he was one of our greatest mechanics, but in justice to ourselves I must say the failure of the one crank was for want of experience in regard to the danger of sudden expansion and contraction of steel castings. The cut of crank here given will show the mode of heating pursued before putting it on the shaft, and it is left for each one with experience in steel castings to form his own conclusions. The cause of breakage was never charged to bad material. Mr. Salom further says: "The Bessemer process, however, in the manufacture of steel castings is as yet open to the objection of making a less homogeneous and a harder metal than open-hearth." Mr.

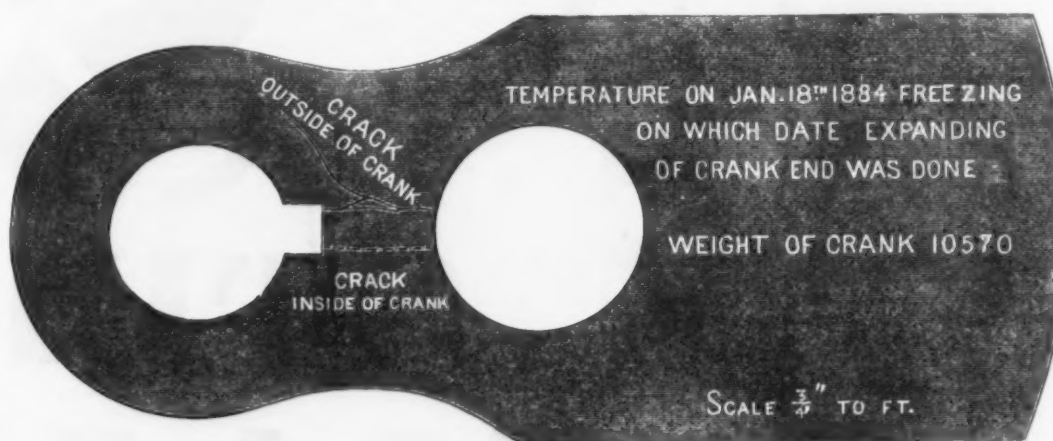


Fig. 4.—Cracks in the Crank.

dealing with a material that has not been worked in any way, either by the hammer or rolls. I give below the results of a few chemical and physical tests.

Test No.	Carbon.	Silicon.	Manganese.	Tensile strength.	Elongation in 2 inches, per cent.
3	0.11	0.49	0.61	68,000	13
4	0.33	0.19	0.43	68,000	12
6	0.34	0.36	0.25	55,000	8
8	0.27	0.35	0.31	70,000	6
130	0.35	0.35	0.38	64,000	7.05

I also give the analyses and tests of the Terrenoire metal: *

Charge No.	Carbon.	Silicon.	Manganese.	Tensile strength.	Elongation in 2 inches, per cent.
2,078	0.36	0.36	0.41	66,500	12.8
2,932	0.36	0.36	0.41	68,000	13.5
18	0.317	0.30	0.48	80,700	14.8

The physical tests in both cases were made on the raw metal; annealing about doubles the elongation without greatly affecting the tensile strength. It will be seen from the above tables that the steel made by the Standard Steel Casting Company compares favorably with that of Terrenoire, which is the best cast steel of which we have any records. The steel in the case of the last three tests in Table I was not made for the purpose of developing the highest possible elongation.

Notwithstanding the excellent results that have been obtained at Terrenoire and other places on the Continent, I am convinced, after a careful study of the subject, that the highest attainable physical qualities in a casting can only be secured by compression. That is to say, although we are now able to make perfectly solid, soft, strong steel castings having a reasonable amount of ductility, the solidity is obtained at the expense of the ductility. Now if we

steel casting that has ever been made in this country. This proves that we are abundantly able to produce in the United States the heaviest castings for ordnance if the Government would only pay reasonable prices and make reasonable specifications.

Referring to this subject, we have the following communication:

Editor Iron Age.—DEAR SIR: Thanking you for your courtesy in sending me a copy of Mr. Salom's paper on "Steel Castings," proffering me the use of your columns for any remarks, I will say that I have been in the steel-casting business over 15 years. Starting with a one-pot furnace in a 14 x 20 foot rough-board shed, we have increased to our present size, with buildings covering $\frac{1}{2}$ acres. During that period I have known of the loss of hundreds of thousands of dollars by not less than 42 experimenters in steel castings, who have been unsuccessful and have been forced to retire from the business. None of the failures alluded to were caused by unfair competition or cutting of prices. Mr. Salom says: "I have no hesitation in saying, and say it without fear of contradiction, that crucible steel castings are a failure and always will be." The Pittsburgh Steel Casting Company have made thousands of tons of crucible steel castings of every description to take the place of iron castings and wrought forgings; and to prove that crucible steel castings are not a failure, I will give the names of prominent firms who have bought from \$10,000 to \$200,000 worth each from us for varied requirements:

New York, Sergeant & Cullingworth Company.

Brooklyn, E. W. Bliss.

Philadelphia, Morris, Tasker & Co.

Boston, Putnam Nail Company.

Portland, Me., J. J. Frye.

Manchester, N. H., Manchester Locomotive Works.

Worcester, Mass., Washburn & Moen Mfg. Co.

Salom gives his best tests in ductility and elongation. The highest per cent. of elongation shown is 12 per cent. in 2 inches, and the lowest 7.5 per cent. By kind permission of Commodore Montgomery Sicard, chief of Bureau of Ordnance, Navy Department, Washington, D. C., we give the following tests cut from 6 and 8 inch gun-carriage Bessemer steel castings. The chemical analyses of the cracked crank was the same as from Nos. 1 to 9 in the official report:

Requirements.		Results produced.			
Unforged castings.	Carbon.	Required elongation in 2 inches, per cent.	Tensile strength.	Elastic limit.	Elongation, per cent.
No. 1.....	0.16	5	80,000	43,000	15.8
No. 2.....	0.16	5	88,000	43,000	17.6
No. 3.....	0.16	5	85,700	32,800	13.06
No. 4.....	0.16	5	81,400	31,800	14.7
No. 5.....	0.16	5	79,000	32,400	17.5
No. 6.....	0.16	5	80,000	41,000	17.15
No. 7.....	0.16	5	76,400	30,200	15.25
No. 8.....	0.16	5	75,600	33,400	19.6
No. 9.....	0.16	5	82,800	31,000	17.50
No. 2.....	0.16	25	71,000	35,000	27

The tests, as given by Mr. Salom, of open-hearth steel castings are as follows:

Carbon.	Tensile strength.	Elongation in 2 inches, per cent.
0.11	63,000	12
0.33	68,000	12
0.34	55,000	9
0.27	70,000	8
0.35	64,000	7.5

I think a comparison of the above tests by Mr. Salom and the Pittsburgh Steel Casting

ESTABLISHED 1855.

INCORPORATED 1882.

Began Making STEEL NAILS July, 1884.

JEFFERSON IRON WORKS
STEUBENVILLE, O.
STEEL
NAILS

OFFICE AND WORKS:

STEUBENVILLE, OHIO.

Company will not tally with his assertion of the superiority of open-hearth over Bessemer steel castings. I would be happy to have experts appointed to make tests taken from each crank if practicable, the one made under Mr. Salom's supervision in 1882 of open-hearth steel, and the one made by myself in 1883 of refined Bessemer steel. I will be willing to allow him the advantage of 2 per cent. in elongation in 2 inches from unforged test piece, and 5° in the cold bending test, after being drawn from a 2 inch square test piece to 1/2 inch square, and allowed to get cold before bending, and assert that our four cranks will show a more uniform chemical test and will be freer from surface defects. In conclusion, I claim that the Pittsburgh Steel Casting Company have made 90 per cent. of all the steel castings made in this country. My idea of steel castings is that graphite should not be found in the steel, and the combined carbon, when great ductility is required, should range from 1/100 to 1/200 per cent., and where high tensile strength and wearing surface is required from 1/100 to 1/200 per cent. Perfection has not by any means been arrived at in this business, and a great deal is yet to be learned; but let us be sure that we give a true interpretation to the facts already ascertained.

WILLIAM HAINSWORTH.

American Institute of Mining Engineers.

HALIFAX MEETING.

Second Notice.

The opening address of the president published in last week's issue) having been postponed by special request until Thursday evening, the first paper of the Wednesday morning session and of the meeting was by Mr. E. Gilpin, Jr., inspector of mines of Nova Scotia and honorary secretary and treasurer of the local Executive Committee.

THE GOLD FIELDS OF NOVA SCOTIA.

These fields, Mr. Gilpin stated, stretched along the Atlantic shore of the Province, from Yarmouth to the Strait of Canso, a distance of over 200 miles, in some places 40 miles wide. The country underlain by the auriferous strata and associated rocks is rough and generally unfitted for farming, so that it is comparatively unexplored. The total area has been estimated at from 6000 to 7000 square miles, about one-half of which is occupied by granitic rocks. The exact age of these measures has long been a vexed question among the provincial geologists, and is perhaps not yet positively settled. They may be roughly divided into two sections. The upper one is composed principally of black slates, frequently pyritiferous, with beds of quartzite and veins of quartz. The lower section is made up of alternating beds of quartzites, fine sandstone, and frequently felspathic, and gray and bluish-black slates, sometimes magnesian, and holds numerous veins of quartz. The thickness of the upper section has been estimated at 3000 feet, and that of the lower section at 9000 feet. The veins in the upper section, though frequently auriferous, have not yet proved of economic value. The veins worked vary in width from 1/2 inch to 6 feet, the most common thickness being from 4 to 6 inches. The quartz is usually crystalline and fairly friable, but also oily and compact. The gold occurs in coarse grains and in minute grains and films in the associated pyrites. The miners rarely crush quartz unless it shows free gold. The minerals associated with gold are iron pyrites, mica, pickel, galena, copper sulphides and blende. Calcaspar is also found, but in some cases it has been observed that the gold diminishes as the proportion of spar increases. Galena and copper pyrites are considered by many miners to hold out the best promise of economic amounts of gold. The veins afford many good examples of chimneys or pay streaks. Their width, dip and downward extension are of the most varied form. The greatest depth of pay streak that has been worked here is 600 feet, and a horizontal length of 300 feet may be considered a maximum. Low-grade ores have been profitably crushed in small mills of 8 to 20 stamps, but no systematic attempt has yet been made to work them on a large scale and as a regular operation.

There is little novel about the mining and milling systems, and they may, speaking generally, be described as rough-and-ready methods, adapted to small veins and a corresponding capital. The shafts are invariably sunk on veins which dip at all angles from 45° to the perpendicular. Stopes are started at all depths and carried direct from the shaft underhand, in steps, and part of the rock is stowed on the following scaffolds. Few shafts exceed 200 feet in depth, and the workings seldom extend much beyond the pay streak. The mills claim no striking originality in pattern. Exact figures of the amount of gold saved cannot be given. About 15 per cent. of the free gold is lost, and little of the gold held in the sulphides, etc., is saved. The amount of the sulphides, etc., varies from 1 to 60 per cent. in the quartz veins, and their gold values sometimes run \$4000 to the ton, but I presume that from \$40 to \$50 would represent their average value. A few small lots have been concentrated and shipped to Swansea, but the problem of the tailings has not yet been solved in Nova Scotia.

The cost of mining per ton varies greatly with the hardness of the incasing rock and the size of the vein. It may be put down at 50 to 70 cents for the open-cast low-grade workings, and from 95 cents in narrow slate belts up to \$15 in narrow veins. The value of the ore crushed varies from 3 dwt. to 4 1/2 ounces per ton; the average annual value has fluctuated between 10 dwt. and 1 ounce 2 dwt.; the total amount crushed since the year 1862 is (from official returns) 495,923 tons, yielding 366,976 ounces, an average value of about 14 dwt. In conclusion I may remark that the gold ores are the property of the crown, and are leased for revenue purposes. The areas are 150 by 250 feet in size, and any number can be leased on payment of a fee for the execu-

tion of the papers. The royalty is at the rate of 2 per cent. on the gold, valued at \$18 an ounce, and is paid by the mill owner, who is obliged to take out a license and to make regular return of his work to the Mines Department. The areas are bounded by vertical lines, and laid out as nearly as possible along the general course of the veins of the locality they are applied for.

THE APATITE DEPOSITS OF CANADA.

Dr. T. Sterry Hunt, in presenting a verbal abstract of his paper, entitled "Studies of the Apatite Deposits of Canada," alluded to his published communication on the Canadian apatite deposits made to the Institute in February, 1884, and proceeded to describe some of the later results of mining this mineral in the Lièvre district, to the north of the Ottawa River, where the mines are as yet confined to a small area in the townships of Buckingham, Portland, Templeton and Derry, the earlier workings having been along the Rideau Canal, to the south of the Ottawa. The large mining operations lately undertaken in the Lièvre district show that the crystalline phosphate of lime or apatite belongs to lodes of great size, which traverse the ancient gneiss of the region. These lodes include granitoid felspathic rocks, pyroxene rock, with large masses of quartz, of carbonate of lime, of pyrites and of apatite. All of these often show a banded structure not unlike that of the gneiss to which they are evidently posterior, and of which they often contain fragments. Their study is full of interest to the geologist. The mining operations on these great lodes are often over 100 feet in breadth, are in part by open cuts and in part by shafts, and have reached depths of a little over 200 feet. The production of some three or four of these mines in 1882 was from 4000 to 5000 tons each of commercial apatite. The improved machinery and the better system now being introduced here is greatly increasing the yield of these mines, some of which during the past summer have put out 600, 700 and even 1000 tons in a month. The mineral, yielding on an average 80 per cent. of phosphate of lime, is now worth in Montreal \$18 per ton, and is mined with great profit. It is now chiefly shipped to Great Britain, where it is used for the manufacture of high-grade superphosphates, but it is believed that in the near future a larger market will be found for the apatite in the United States and Canada. The growing demand for high fertilizers on this continent, and the fact that the apatite of Canada may be shipped to the valley of the Ohio and Mississippi, and much cheaper than the phosphate rock of South Carolina, gives a great importance to these Canadian mines. The output from those of the Lièvre district this year will probably exceed 30,000 tons. Works on a large scale are now in construction at the lower falls of the Lièvre on the line of the C. P. R., for the grinding of phosphates and the manufacture of fertilizers. While the production of the Lièvre mines has caused the neglect of the earlier discovered deposits of the Rideau district, there are among these some which, in the speaker's opinion, will be found, when properly developed, not inferior to those of the Lièvre, and he believes that these two districts of phosphate-bearing veins in Canada will soon become an important source of revenue to the country and a great benefit to the agriculture of the continent.

Mr. R. P. Rothwell, drew attention in this connection to the value of arsenic mixed with phosphates for farming purposes. This was being made from mispickel ores at De-Idoro, Ontario.

The next paper read by the secretary was on

THE PICTOU COAL FIELDS.

by Henry S. Poole, F.G.S., associate of the Royal School of Mines, London. This field is geologically of much interest. It is small, but with some seams of unusual thickness, the Main being as much as 38 feet. The quality of the coal and in several instances the associated beds of shale and sandstone change to a remarkable degree within short distances. The strata dip at inclinations that carry the coal to depths of 3000 feet or more; heavy faults cut up the district, and the new Glasgow conglomerate of disputed age separates it from the upper carboniferous measures in which no seams of workable thickness are known. It offers to the geologist much ground for study and speculation.

The commercial value of the field is affected by its restricted area, the varied quality of the coal contained and its advantageous position on the main land, with railway connection and home markets, set off by the physical difficulties which make the cost of production high. It has been so long a habit with us to speak of our resources of coal as boundless that any insinuation that avoidable loss in working is a national loss have hitherto fallen on idle ears, and while it is not my purpose to underrate the riches we do possess, I deem no good end is served by echoing exaggerated estimates, which encourage an indifference to wasteful mining and consumption of fuel. It should be clearly understood that these remarks specially apply to Nova Scotia proper. Cape Breton, with fields of unquestioned extent, is not included. The areas of its coal deposits have not been so greatly exaggerated, nor are its less inclined seams subject to the same proportionate waste in working and screening which attends the running of the more highly inclined beds of this and the Cumberland fields.

The combined area of our coal lands has frequently been put at 18,000 square miles—equal nearly to the total area of the Province—while a liberal estimate based on our present knowledge cannot make the extent of workable seams to cover one-fiftieth of that surface. In the Pictou district so largely is it affected by faults and the quality of many of the seams being in parts reduced below a marketable grade that an output equal to that of the United Kingdom in the last three years would more than exhaust its resources. And this estimate will not seem so surprising when it is known that barely 10,000 tons per acre were obtained from an aggregate of 550 acres of seams called 22 and 38 feet thick, a quantity that a 9 foot seam of clean coal under favorable conditions has produced.

In Cumberland County, also, similar conditions prevent a large proportion of the nominal contents of the seams being obtained, and the angle at which they all dip must within a comparatively short distance put them beyond a depth at which the coal can be profitably extracted. In the Pictou field operations have been in progress for over half a century, and the contrivances used for drawing coal have developed from a simple horse gin and skip to the modern high-pressure engine—in one instance direct-acting, with cylinders 38 inches and drums 18 feet in diameter. The mines railway to the Loading Ground is said to have been the second railway built in America; the gauge adopted—4 feet 8 1/2 inches—has since become the standard, at any rate on this continent. The district can still show some antiquated appliances and a working locomotive built so long ago as 1838.

The field has been gone over by the geological survey, and in the report for 1866-69 will be found detailed sections and analyses which need not here be more than referred to. It may be considered as divided into three districts: The central or Albion; the west or Westville, and the eastern or Vale; the northern and southern portions being practically of small importance. The Albion section shows some 4000 feet of measures, the lower part being conformable with stone-grit beds, and the upper part some 100 feet of unbroken black shales over the coals. These overlying beds are rapidly transformed to the westward, and the black shales give place to sandstones within a mile of the Ford pit, no break intervening. The section is known to contain a number of seams, but only four are thought to be of present workable value; others of sufficient thickness are, so far as known, of inferior quality.

A down throw of 1600 feet to the west separates this district from that of Westville, where only the equivalent of three upper seams are exposed. The outcrops of any lower seam, if they exist, as in the Albion series, have not yet been discovered; the surface is heavily drifted, or perhaps they are cut off by a fault. The Vale district on the other side presents no characteristics in common with those of the Albion, and the relation of the beds of one series to those of the other is still a matter of dispute. It is in the form of a synclinal trough, with its axis east and west, the seams being thickest on the southern outcrop where they are worked. On the northern side the seams are thinner, and to the west they come to the surface before they reach the fault that separates them from the representatives of the Albion bed. The coals of this field are non-caking, chiefly used for steam and domestic purposes. Some make good coke for iron furnaces.

In working the beds, as the crops of those opened have already been moved away and the difficulties that attend the extraction of coal from increasing distances and greater depths present themselves more forcibly, problems come up which make it seem doubtful whether parts of the field can in the future be economically won. The depth to which the deep seam carries the coal, and the tenderness of the working measures requiring in parts close timbering and frequent renewals, entail such expenses for dead work that it becomes a question, How can the seams of minor quality and thickness be profitably worked, not only at shallow depths, but at the great depths to which in all probability they extend? The assistance of mechanical engineers must be sought for aid in the solution of this question, and the great advances made of late years seem to indicate that the difficulties which but a short time ago appeared insuperable may be greatly reduced or wholly overcome. Lang's patent supplies a light rope of great strength and durability, so that the increase of dead load due to depth is diminished. A speed of 35 miles an hour in mid-shaft attained with safety in some deep pits shows how loss of time due to distance may be much reduced by careful attention to construction. Still, steep inclines which we have to consider do not as ordinarily laid out offer the same facilities for high speed, and we do not know where to look for good practice that would indicate the limit of speed on inclines of, say, 15° and 30° for ordinary work, and again when men are riding. To a depth of 1000 feet workmen may be got to walk up and down. To greater depths the tax on their strength would be of some moment, and sooner or later the question of the men riding has to be considered, and if the safe limit of speed be slow, and but few men allowed to ride together, the loss of time while moving them will be more serious the deeper the slopes become. Another difficulty is met with in dealing with the water that finds its way from crop openings to the deep.

As a usual thing the seams in depths are quite dry and even dusty. Can this water from above be kept back by a barrier of unwrought coal? The Acadia Coal Company are trying the experiment with a barrier of 200 feet left unwrought right across their area. Above the barrier they have placed at a vertical depth of 990 feet a duplex compound engine which forces water to the surface in one column; and to remove a small quantity of seepage they are placing in the deeps a hydraulic engine which will get its power from the main column. The experience of the pipe line companies in successfully dealing with pressures exceeding 1000 pounds per square inch, and with continuous lengths of many miles of pipe, shows that this system can be made to meet this difficulty provided the action of the water on the pipes be not very corrosive.

I have referred to the changes that have been found to occur in the character of the strata within very short distances, and instanced the gradual substitution of sandstone for bituminous shales. Similar changes occur in coal seams; for instance, a poor coal within a mile becomes of superior quality, first coking fairly well, then not coking; then the coal deteriorates again and ultimately the bed ceases to be coal—in fact, most, if not all, of the seams in the district show alterations in quality, and this liability to change, coupled with the smallness of many of the working areas, deters owners from putting down deep pits and costly plants, and leads them to content themselves with extending their crop slopes, and so running lift by lift, thereby adding to the duty of

their surface machinery. An exception has been made at the Drummond Mine, where single high and low pressure cylinders are coupled in an engine placed half-way down the prospective slope to hoist all coal from the deep of them, and deliver to the landing of the surface engines. Details of some of the machinery used in this field are given in the notes published for the benefit of the Pictou excursionists. Many of our appliances and mining practices are, we know, open to criticism. So in mining the seams we have failed to extract or have wasted large quantities of coal, and we have suffered disasters that entailed serious loss of life and property; therefore I do not thrust on the notice of the Institute the extent to which we have followed the progress effected elsewhere, but rather ask them to note the weakness of our practices and our failures, that this visit may lead to subsequent improvement and our better instruction.

I am the more induced to take this ground since, when commenting on this year's disasters in European mines, the American *Engineering and Mining Journal*, which, I take it, though not an organ of the Institute, is in sympathy with it and expresses opinions which some of its members have formed from their practical experience, wrote as follows: "Our exemption (in Pennsylvania from frightful calamities) is solely due to the better ventilation and more intelligent supervision exercised. * * Well-arranged airways and plenty of fresh air, strict discipline and vigilance can prevent any such terrible disasters—we hesitate to say accidents—as those recorded." Now our practice and circumstances somewhat conform to those under criticism, and, as we have hitherto considered no better could be done with such strata as is often met with in bituminous mines at depths of 1000 or more feet, we shall be glad to have our errors exposed, and have not only to remember the honor the Institute has done us in visiting our mines, but the good results which followed.

The paper and subject were discussed by Mr. Rothwell, Mr. Ashburner, Mr. Gilpin, Mr. D'Inville and others, and some of the differences between American and Nova Scotian methods of working contrasted and information elicited as to methods for prevention of waste, and as to the extent and continuity of coal seams.

The last paper of the session was on "Our Glacial Problem," by Rev. Dr. Honeyman.

Wednesday Afternoon Excursion.

The afternoon was given up to a steamboat excursion around the beautiful Halifax Harbor, in the steamer St. Pierre. The day was an ideal one in every respect, and some 300 persons were gathered on the deck of the steamer as she explored the nooks and arms of the bay and basin. The war ships Canada, Dido and Northampton dipped the Union Jack in deference to the Stars and Stripes which floated at the foremast of the St. Pierre. Through the port holes the Jack Tars waved their caps and kerchiefs and were answered by a liberal flaunting of handkerchiefs from the St. Pierre. The "Arm," a narrow inlet of the bay, lined on both sides by beautiful residences, reminded many of the Scottish lakes, and justified to the visitors the name of the Province—Nova Scotia.

In the evening a promenade concert, with fireworks, was given in the public gardens.

THE MONTAGUE GOLD MINE.

Thursday morning was given up to a visit to the gold mine at Montague, some 7 miles from Dartmouth, a small town on the opposite side of the harbor from Halifax. This is one of the recently opened mines, or, at least, it is only recently that pay streak has been struck rich, and rich it is. Old engineers well acquainted with Western mining declared they had never seen so much gold in so little quartz as was in a little pile of, say, a bushel, that graced the center of the table spread for lunch. The mine is a small one, with a shaft 260 feet deep, working but few men, with 24 stamps. The following, issued by the management, will give some idea of the success this season:

Product, month ending June 15, 1885.....\$7,608.13
Product, month ending July 17, 1885.....6,784.31
Product, month ending August 13, 1885.....5,189.80
Product, 54 days' crushing, ending September 3, 1885.....6,564.48
Product from September 5 to September 18, 1885, estimated.....7,500.00
Total.....\$38,646.51

Thursday Afternoon Session.

The second session of the Institute was held Thursday afternoon in the chamber of the Legislative Council of Nova Scotia, a body answering to our State Senates. The first two sessions were held in this room, the third and last in the Hall of the Young Men's Christian Association.

Quite a number of papers were read by title, after which the following paper was read by the author, A. V. Abbott, C. E., New York City:

THE PRESENT VALUE OF STEEL CASTINGS.

During the past four years I have had occasion to make quite extensive use of steel castings in the manufacture of testing machines and large scales for Messrs Fairbanks & Co. The failure of some of these castings at stresses much below those which were claimed for them by the makers induced me to institute a series of experiments to determine the actual constructive value of the steel castings now to be obtained in this country. The art of steel-casting is rapidly improving, almost every issue of the scientific press bringing accounts of some new development; consequently, the results of the following experiments are only exponents of the value of steel castings as at present made.

In order to make the examination as thorough as possible, ten sets of patterns were made and forwarded to as many different firms in the country who advertised to make steel castings. The first part of the accompanying table gives a list of these manufacturers, together with the price per pound. The order accompanying the patterns simply requested the manufacturer to supply two castings from each pattern of his ordinary product of steel. These castings were sent to me and paid for in the usual manner, so that it is probable that the samples fairly represent the quality of the average of steel castings, and are free from the suspicion of being "special runs." Two pat-

terns were sent to each maker, one being a straight bar 2 inches square and 30 inches long, and intended to supply samples for tests in compression and transverse stress, the other being a bar 1 1/2 inches square for a distance of 6 inches on each end, and turned round for a space of 12 inches in the center, and was designed to furnish tension test pieces. Two castings from each pattern were ordered, so that any questionable result could be checked by duplicate experiments. The intention in commencing this investigation was to make tests in tension, compression and transverse stress on samples from all the makers, and then as a matter of additional information to supplement the physical tests with a chemical analysis. Unfortunately from only seven of the ten manufacturers samples were received, and so much delay has been experienced in obtaining these that at present I am only able to give the results of the physical tests, and shall be obliged to postpone the account of the chemical investigation to a future paper:

No.	Name of Company.	Price.
1.	Solid Steel Casting Company, Alliance, Ohio.	10¢
2.	I. G. Johnston & Co., Spuyten Duyvil, N. Y.	12¢
3.	S. G. Fagg & Co., Philadelphia, Pa.	12¢
4.	Chester Steel Casting Company, Chester, Pa.	11¢
5.	Solid Steel Casting Company, Mills Building, New York City.	10¢
6.	Pittsburgh Steel Casting Company, Pittsburgh, Pa.	10¢
7.	McIntosh, Hemphill & Co., Pittsburgh, Pa.	10¢
8.	Cowling Steel Casting Company, Cleveland, Ohio.	10¢
9.	Standard Steel Casting Company, Thurlow, Pa.	10¢
10.	Eureka Steel Casting Company, Chester, Pa.	10¢

Elastic No.	Limit.	Ultimate mate.	Elongation.	Reduction.	Modulus.
1	28,923	43,631	6.00	0.72	25,150,000
2	25,610	36,880	0.40	0.82	24,000,000
3	25,650	42,380	0.80	1.30	21,000,000
4A	30,000	30,920	0.30	.....	30,000,000
5	23,116	44,221	6.00	.....	18,000,000
6	21,385	38,301	10.00	.....	23,775,000
7	31,180	46,156	2.00	.....	27,600,000
8	35,840	56,734	10.00	2.07	35,150,000
9	35,445	52,330	9.00	1.47	38,525,000
9A	38,217	63,058	29.88	19.88	.....
9A	38,217	62,816	20.50	18.18	.....
10	17,522	32,151	8.00	3.42	20,000,000

1	2	3	4	5	6	7	8	9	10
35,011	31,250	25,140	24,350	26,750	29,703	36,110	37,027	38,408	.....
.....
23,338,000	30,000,000	15,712,000	19,000,000	20,600,000	21,000,000	24,000,000	20,800,000	19,000,000	.....

1	2	3	4	5	6	7	8	9	10
6,000	2,500	2,000	2,500	3,000	4,750	4,000	4,000	2,500	.....
8,000	3,570	3,950	3,535	4,181	5,730	6,250	5,480	6,810	4,010
0.72	0.45	0.32	0.31	0.88	0.15	0.60	0.20	0.21	0.35
20,000,000	19,000,000	18,000,000	20,800,000	30,550,000	20,000,000	25,000,000	28,000,000	20,000,000	.....

In my own practice I find it necessary to do very little machine work on steel castings; consequently, the patterns for the test pieces were designed to furnish castings that could be placed in the testing machine just as they came from the sand, without any machine work. By this means it was hoped to embrace in the results the element of an undisturbed skin, which is generally considered so important in castings. My impression is that, in the case of true steel castings, this skin tends to decrease the strength, as it seems to be less ductile than the interior, and, yielding first under stress, assists the failure of the whole. Consequently, I am of the opinion that the results of the experiments I have made would have been higher if the outer surface of the test pieces had been removed. Additional investigation is required to demonstrate this, yet the accompanying results may be taken as a fair indication of the value of steel castings when used without the removal of the outer layers.

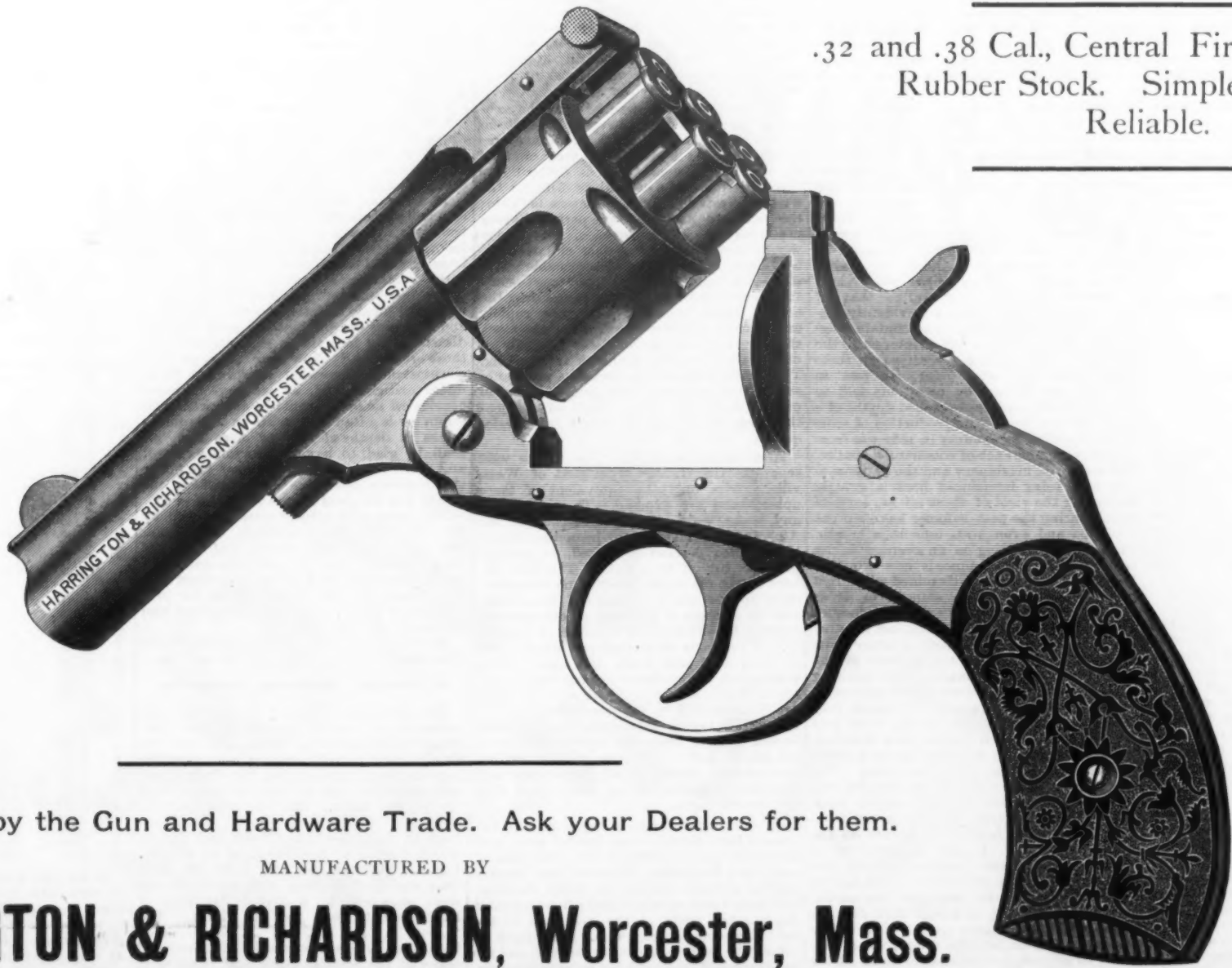
In the tension and transverse pieces the samples were placed in the machine just as they were received from the makers, but the compression specimens had each end trued off, so as to obtain a fair bearing against the compression plates. The rest of the casting was left undisturbed, so as to give a comparison with the results given by other stresses.

All the tests were made on the testing machine used by me in the Department of Tests and Experiments, Fairbanks & Co., New York City. The ultimate strength of any material is always a very uninteresting quantity. The elastic strength is, on the contrary, very valuable, for it is the only guide that can lead the engineer to successful construction. Usually the elastic strength is some definite ratio of the ultimate resistance, but in steel of different compositions, and especially in steel castings where so much depends on the crystallographic arrangement of the particles, this ratio may vary very considerably. Consequently, in these experiments I have taken the greatest care to accurately determine the elastic limit and modulus of elasticity, and have given comparatively little attention to the ultimate strength; indeed, for want of time, the ultimates in compression have been omitted. In tension, compression and transverse stress each piece was put in the testing machine and submitted to regularly-increasing loads of as nearly as possible 1000 pounds per square inch of section, and the deformation of the specimen measured to 1/1000 inch. As long as the increments of deformation were proportional to the increments of stress, the loads were assumed to be inside the elastic limit, and the point at which they became disproportionate was taken as the limit; consequently, the elasticities here given may be relied on to be correct within 500 pounds per square inch.

The results of the tension and compression tests have been reduced to pounds per square inch and the elongation and reductions to per cent, and, excepting in the cases of those tests marked "A," all the experiments have been made on the same size bar and under the same conditions as to size and preparation of specimens and duration of tests. The tension specimens were 1 1/2 inches in diameter and 10 inches long under gauge. Compression specimens were 2 inches square and 2 1/2 feet long under gauge. The transverse specimens were 2 inches square, 2 feet long, clear span, and loaded at the center. The results

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Rubber Stock. Simple, Effective,
Reliable.

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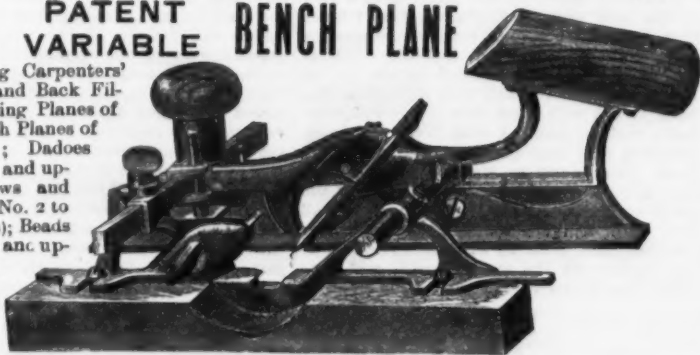
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HARRINGTON & RICHARDSON, Worcester, Mass.

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FALE'S PATENT VARIABLE BENCH PLANE

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SMITH'S PATENT NEW Automatic Revolver.

MODEL 1883.

Shell Ejector.
200 Caliber.



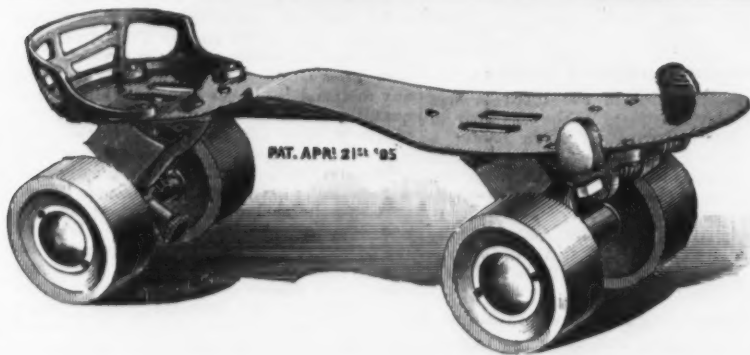
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Every Respect.

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For Cutting all Kinds of Leather Washers,
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Made in Two Sizes, 3 and 6 inches; have a graduated scale and can be easily adjusted to cut any desired size up to 6 inches.
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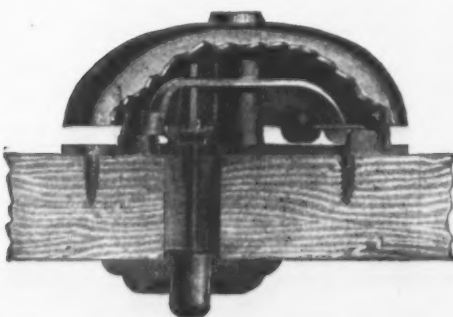
SMALL T RAILS,

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BLOOMFIELD'S PATENT

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This Gong Bell is cheap, simple and durable. There is nothing connected with it liable to get out of order, and is sure to give satisfaction wherever it is used.
Manufactured and for sale by

Flagler, Forsyth & Pierson

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Patent Lock Snap.



The neatest and safest device ever invented for hitching horses; price, \$2.50. Kennel and Leading Chain with Patent Lock, \$1.25 each. Travelers' Safety Baggage Guard, 75 cents. Bicycle Chain, 75 cents. These goods are all nickel-plated, and with keys. Sent, prepaid, to any part of the U. S. on receipt of the price.

O. A. BASSETT, Plainville, Hartford Co., Conn.

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PATENT SPOOL WIRE FOR THE RETAIL HARDWARE TRADE.

Dealers who handle it do away with the BROKEN BUNDLE BUSINESS and sell small quantities by the spool only. It is a convenience for both dealer and consumer. It is SHELLAC COATED and CANNOT SWEAT: is wound like spool cotton on QUARTER POUNDED, HALF POUNDED and ONE POUNDED Spools, one dozen spools in a box.

Our spooled HAIN WIRE is the best in the market.

For Sale by

Hardware Jobbers Everywhere.

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SPECIAL WIRES FOR MANUFACTURING PURPOSES ON ANY SIZE OF SPOOL.



of the transverse tests have been reduced to equivalent bars of 1 inch square and 1 foot clear span, but the deflections are given in $\frac{1}{16}$ inch, without reduction. The modulus of elasticity in transverse stress has been calculated by the formula $E = \frac{w b^3}{D \delta h^3}$.

While this neglects the effect of shearing stress, it is within the limits of error due to the inequality of rough castings.

The tests marked "A" were made on pieces differing from the above description. The sizes of specimens and method of testing "2A" were as above, but the material was not steel, but a superior gun-metal perhaps containing wrought iron or steel scrap, and supplied at 6 cents per pound. "9A" were test pieces submitted to the United States Navy Yard as samples of steel casting to be furnished for naval construction. These pieces were turned from end to end, and reduced in the center for a length of 2 inches, the diameter of the reduced portion being 1 inch.

Omitting "2A," and taking an average of the elastic, elongation and moduli of the tension tests, 29,000 pounds, 9 per cent. and 25,670,000 pounds are found. With the exception of the elongation, which is low, this is equal to good iron, while either Nos. 7 or 9 furnish a material that is decidedly superior. In comparison with cast iron we here find a material that at the least calculation is three times as efficient for construction.

The results of the transverse tests are similar in character excepting that, subjected to this form of stress, the lack of ductility tells badly against the material, and, preventing the particles from accommodating themselves to the stress, causes rupture sooner than would have been anticipated from merely a consideration of the tension results. In compression the hardness and rigidity of the material make it compare still more favorably with wrought metal, especially where it is to be used under circumstances free from lateral or bending stresses. Between steel castings and cast iron, however, the comparison in compression is less favorable to the former, as in this form of stress the materials resemble each other closely.

The *belle noire* of steel castings has been the possibility, not to say probability, of blow-holes, the presence or absence of which can only certainly be ascertained by an examination of the fracture of the piece in question. Still, if a maker has succeeded in producing sound castings of a good quality, the presumption is that the operation can be repeated. The description of a steel fracture is a difficult piece of literature, for words can hardly convey the impression that the practiced eye at once receives, and so I have had the ends of the tension and transverse test pieces cut off, and have brought them here to let them speak for themselves. An examination of the specimens will show that only three of the makers have supplied samples from which both the tension and transverse pieces show perfectly sound fractures, free from blow-holes, viz., Nos. 3, 7 and 10. All the other samples are imperfect, either through the presence of blow-holes or from a soft and spongy center. Sample No. 1 shows a great want of uniformity between the fractures of the transverse and tension pieces. The transverse piece presents a fracture light in color, finely crystalline, with high metallic luster, and perfectly sound, excepting a small pipe in the center. The tension piece, on the contrary, is very dull in color, with a foliated rather than a crystalline structure, with numerous blow-holes around the periphery. Indeed, the difference between these two specimens is so great as to give rise to the suspicion, at least, that they were not cast from the same metal. Specimen No. 2A simply presents the ordinary cast-iron fracture. No. 3 is perhaps the most interesting of the collection. The castings seem to have been subjected to a process of cementation, whereby an outer coating of steel about $\frac{1}{4}$ inch thick has been formed around a center of totally different physical properties. It is probable that anything affecting this exterior skin would materially alter the value of the casting. The remainder of the samples present in their fractures little that is noteworthy, all being bright crystalline of various degrees of fineness and metallic luster, Nos. 6 and 9 only being seriously affected by blow-holes.

The economic value of steel castings is a matter so largely dependent upon the circumstances of each particular case that a generic statement is hardly possible. Where a large number of similar castings are required, the cost of the pattern, unless exceedingly complicated, is too small to affect the price of the product, which may be generally stated at about 11 cents per pound. Where but a single casting is required, the cost of the pattern will increase that of the casting from 10 to 50 per cent. Thus it may be safely assumed that the net cost of steel castings as they come from the sand will rarely exceed 15 cents per pound unless the articles are very small and light. This is about 3 per cent. higher than the usual prices for iron and steel forgings. Yet for shapes that are at all complicated the steel casting is much the more economical, inasmuch as there is little or no waste metal, nor is any expensive machine work required to dress the rough hammered piece to its appropriate shape. Therefore, for parts of machinery that are subjected to anything but direct compression the steel casting may be, as at present made, considered the successful rival of forged work. Where, however, compression is alone to be resisted, cast iron will for a long time to come hold its own, for, subjected to this stress, the steel is but little superior to the iron, and the great difference in price will long continue to make iron the successful competitor.

This paper was discussed by Messrs. Weeks and Collingwood. Mr. Collingwood said:

The subject treated by Mr. Abbott is one that has occupied the attention of foreign engineers for some time, and it may be of interest to review some of the results thus far obtained, more especially as they seem to be more favorable than those obtained here.

Mr. Wm. Parker, chief engineer of Lloyds, states that stern-frames, rudders, and stem-pieces of ships, also crank-shafts up to 8 tons weight, and a gun carriage 28 tons in rough and 17 tons finished, have been

cast in steel and are giving entire satisfaction, also locomotive axles. Great stress is laid by French engineers on the necessity for prompt removal from the molds and annealing and tempering in oil after removal. A test of a casting unannealed gave a tensile strength of 32 tons and 16 per cent. stretch; when annealed 33 $\frac{1}{2}$ tons and 17 per cent., and when tempered in oil 38 $\frac{1}{2}$ tons and 17 per cent. The tests by torsion, extension, transverse strains, percussion, rolling and hammering and drop tests all gave more favorable results than the same on wrought iron. Transverse tests of rough bars cast 1 inch square gave a strain in exterior fibers of 53,000 to 85,000 pounds per square inch, and while tempered in oil 102,000 pounds, and after planing similar bars bent 90° to 100° before failure. It is claimed that for large masses hammering does no good, as it does not reach to the interior, and for this reason large shafts, &c., are just as likely to be sound when cast directly as when forged. Failures which have taken place, it is claimed, can all be traced to a lack of the precautions necessary for sound work. A recent paper describes a method of making castings from wrought-iron scrap which has been very successful. The result when best Swedish scrap was used was to increase the strength of the iron about 20 per cent. and to diminish the elongation about 5 per cent. The iron is cast at a high temperature and the molds are specially prepared.

Mr. A. E. Lehman, of Philadelphia, submitted his paper on "Topographical Models and Their Uses," but stated he would have to forego reading it on account of haste.

By far the most interesting paper of the session was Dr. T. Sterry Hunt's on

AN ELECTRICAL FURNACE FOR REDUCING REFRACTORY ORES.

The application of electricity in the extraction of metals has hitherto been chiefly confined to the electrolysis of dissolved or fused compounds of these by various methods. The power of electric currents to generate intense heat in their passage through a resisting medium has, however, long been known, and the late Wm. Siemens thereby succeeded in fusing considerable quantities of steel. It was, however, reserved to Messrs. Eugene and Alfred Cowles, of Cleveland, Ohio, to take a new step in the metallurgical art by making the heat thus produced a means of reducing, in the presence of carbon, the oxides not only of the alkaline metals, but of calcium, magnesium, manganese, aluminium, silicon and boron, with an ease which permits the production of these elements and their alloys with copper and other metals on a commercial scale. In the apparatus devised and now employed by the Messrs. Cowles a column of fragments of well-calced charcoal, so prepared and arranged as to present the requisite electrical resistance, is imbedded horizontally in finely-pulverized charcoal, and covered by a layer of the same material coarsely broken, the whole being arranged in a box of fire-brick covered with perforated tiles, and opened at the end to admit two carbon electrodes $1\frac{1}{4}$ inches in diameter. Through these the current from a dynamo-electric machine of 30 horse-power is now made to traverse the central core of carbon, whereby such a temperature is at once produced therein that platinum-iridium may be instantly melted, and the most refractory oxides already named may be not only fused and volatilized, but reduced to their elemental state with formation of carbonic-oxide gas.

If alumina in the form of granulated corundum is mingled with the carbon in the electric path alumina is rapidly liberated, being in part carried off with the escaping gas and in part condensed in the upper layer of charcoal. In this way are obtained considerable masses of nearly pure aluminium and others of a crystalline compound of the metal with carbon. When, however, a portion of granulated copper is placed with the corundum, an alloy of the two metals is obtained, which is probably formed in the overlying stratum, but at the close of the operation is found in fused masses below. In this way there is got, after the current has passed for an hour and a half through the furnace, from 4 to 5 pounds of an alloy containing from 15 to 20 per cent. of aluminium and free from iron. On substituting this alloy for copper in a second operation a compound with over 30 per cent. is obtained. Already the small experimental plant with a 30-horse-power dynamo is producing daily over 5 pounds of aluminium in the form of a rich and brittle alloy, which by suitable addition of copper is converted into different grades of aluminium bronze. The valuable qualities of these are so well known that it is only their great cost hitherto which has prevented their more general use in the arts. The reduction of silicon is even more easy than that of aluminium. When silicious sand mixed with carbon is placed in the path of the electric current part of it is fused into a clear glass, and a part reduced with the production of considerable masses of crystallized silicon, a portion of this being volatilized and reconverted into silicon. By the addition of granulated copper there is readily formed a hard, brittle alloy holding 6 or 7 per cent. of silicon, from which silicon bronze can be very easily made. The reduction of clay gives an alloy of silicon and aluminium, and with copper a silico-aluminium bronze which appears to possess properties not less valuable than the compounds already mentioned. Even boric oxide is rapidly reduced with evolution of copious brown fume and the formation, in the presence of copper, of a boron bronze which promises to be of value, while under certain conditions crystals of what appear to be the so-called adamantine boron are formed. In some cases also crystalline graphite has been produced, apparently through the solvent action of aluminium upon carbon.

Remarkable results are got by alloying small quantities of aluminium with an admixture of copper and nickel. One of these compounds broke with a strain of 111,000 pounds to the square inch, while a 10 per cent. aluminium bronze broke with 109,000 pounds. An addition of 2 or 3 per cent. of aluminium to brass greatly increases its tensile strength and renders it less susceptible to oxidation. While 15 or 20 per cent. of aluminium with copper yields a brittle compound, an addition of 10 per cent. of copper gives to pure alu-

minium a great increase of hardness and tenacity, forming an alloy which may have a wide application. It may be added that the difficulties in the way of gathering together the reduced aluminium without the aid of copper promise to be overcome at an early day, so that we may expect the cheap production of such alloys and of pure aluminium. The Messrs. Cowles, in their later work, have been aided by the chemical skill of Prof. C. F. Mabery, now of Cleveland, who is associated with them in some of their patents. These now cover not only the reduction of aluminium, silicon and boron, as above described, but the reduction of manganese, magnesium and the alkaline metals by the electric furnace. I had the pleasure of hearing Professor Mabery give the first scientific notice of this discovery before the American Association of Science, at Ann Arbor, August 28, and I then spoke of the early results of Deville and those of Debray on aluminium and its alloys, having myself witnessed many of the experiments of both of these chemists. I then insisted that the importance of this new instrument which the Messrs. Cowles have placed in the hands of chemists for producing and controlling degrees of temperature never before obtained can scarcely yet be estimated either in its economic or its scientific aspect. The heat of this furnace realizes the dream of the alchemist or universal solvent of the alchemists, and he who can rightly use it will be worthy of the ancient title of "magister magnus in ignis." I then suggested trials for the reduction of titanium both from rutile and from titanite ore, which will soon be made. I may add that through the courtesy of these gentlemen I have since been enabled to spend two entire days in their experimental works at Cleveland, with the brothers Cowles and Professor Mabery, when they explained to me several points not yet made public, and allowed me to direct experiments with one of their furnaces. The fusion of quartz and the reduction of silicon without the presence of copper was repeated, as also the reduction of boron and the formation of boron bronze, with many other interesting experiments. The present plant at Cleveland is but a first experimental one, and has only been in operation a few months. The Cowles Electric Smelting Company have secured a large water-power at Lockport, N. Y., and a dynamo-electric machine of 125 horse-power is now building for them at the Brush works in Cleveland, which will soon be in operation at Lockport, and will permit of the establishment of the electric furnace on a large scale.

We shall conclude our notice of this interesting meeting next week.

Hints on the Use of Glue.

James Thompson, writing for the *Decorator and Furnisher*, gives some hints on the use of glue, which, while intended especially for amateurs, are of a character to be of value to practical men also who have not had long experience in the use of this important material. His directions will likewise be of value to apprentices:

So to glue two pieces of wood together that they adhere and become as one, will, at first thought, seem an act so simple as to render any suggestion as to the proper method of procedure unnecessary. And yet, simple as it seems, and in reality is, the number of persons at all conversant with its proper accomplishment are indeed very limited. Of course we here refer to unprofessional people, although we might very properly, without doing an injustice, include many professionals among the number. During the past few years there have been written many dissertations condemnatory of the use of glue in the construction of furniture, inspired mainly by those who, while well intentioned, have been satisfied to gain their knowledge on the subject second hand, or at best from theoretical rather than practical sources.

Glue in its place, and with proper usage, has its value. It is not the use, but rather the abuse, of it that is to be condemned. The joint that is strong enough in itself without the glue can surely lose nothing in stability by its addition. It has often been remarked by workers of wood that in many instances when two pieces of wood have been joined by glue and sundered again the fracture would be found in a fresh place, giving evidence of the fact that a glue joint can be made to be as strong as the original perfect piece. Within the province of the household glue will be found a valuable auxiliary. The best-regulated family must sometime confess to the possession of a piece of furniture requiring its useful offices. The armless chair, the legless table, the broken and humiliated remnants of once useful and pretentious household furnishings, are familiar objects in many a home, yet these may come within the pale of possible redemption and renew the promise of continued usefulness. It has been remarked that, where home efforts have been made at repairing, in very many cases they seem to have been conducted on the theory that the more glue used the stronger the joint would be, but the reverse would be nearer the truth; the less used the better, providing all the parts of surfaces to be joined are covered. It will not be necessary at this time to enlarge on the subject by any elaborate explanation of the reason for this; it is sufficient for our present purpose to know that it is a fact.

Before applying the glue heat the pieces you desire to join; then, when glued, bring and hold together in position with a hand-screw, or, in the absence of this useful article, bind up with cord or rope until the joint is thoroughly hardened, when the restraint may be removed and all superfluous glue scraped off. In addition to this, where possible, it would be well to further make the work secure by the addition of a nail, being careful not to split the wood in the operation. Every description of gluing should be done in the same manner. The wood should be previously warmed, not too much, however, because if scorched the life of the glue will be destroyed, or at least the power of adhesion be impaired. But when all is said there is something of greater importance as a factor of success than any mechanical manipulation, and that is the quality and condition of the glue. In all

well-regulated furniture establishments the utmost care is exercised in keeping it sweet and clean; when old and decayed, glue becomes absolutely worthless for purposes of adhesion. It can therefore readily be seen that to insure satisfactory results such precautions as we have pointed out are alike binding on amateur and professional.

Let it be constantly borne in mind also that as much of the glue as possible should be pressed out of the joint; otherwise it will not hold for any length of time. For the reason that the Japanese do not take this fact into consideration, it will be found that their woodwork crumbles to pieces when submitted to the test of our climate. The joints seemingly are made by little pats of glue or cement, requiring only the slightest blow to separate them. One or two months of our variable temperature is generally sufficient to render the work of disintegration complete, enough at least to satisfy our Oriental artisan that his method of gluing will bear revising.

Coke-Making and the Use of Coke in the South.

Some have already taken exception to my statement that there is not any first-class coke of commercial importance in the South. In further explanation of that statement it may be said that no coke of first class quality is manufactured in the South in sufficient quantities to make any appreciable competition against the product from the Connellsville region. It is admitted that the Etwa Company, in Tennessee, make a coke of very superior quality for foundry use, but if they were to attempt to produce a coke for blast furnaces they would do so at a loss, for it could not be sold at a price low enough to admit of any blast furnace using it. The seam of coal there mined is on the average thin as well as variable in its thickness. The product of these coke works is only about 8000 tons per annum. Again, a very good blast-furnace coke has been made at the Crooke Coal Company's mines, near Glen May, on the Cincinnati Southern Railway. The amount made, however, has been small, and it could not be placed in Chattanooga at a price which would justify any furnace in using it solely. It probably approaches nearer to a standard coke than any yet made in Tennessee. Until a coal is found which will make a coke that has the qualities possessed by the Connellsville product, and that coal is of such thickness that it can be cheaply mined and the coke produced can be sold at such a minimum price that it can be sent South, West or North in competition with the Connellsville product, until then no coke in the South is of sufficient importance to be calculated in the estimate for commercial supply for the country at large.

Mr. Fulton states the requisites of a first-class coke for blast-furnace use to be: 1. Hardness of body. 2. Well-developed cell structure. 3. Purity. 4. Uniform quality. Hence a coke may be hard and dense and not have the proper cell structure. There are no doubt two essentials which enter into the making of such a coke. The first is the proper amount of volatile matter in the coal. There must not be too much, so that sponginess is produced; nor must there be too little, so that the coke made is too dense. Again, there is the construction of the coke oven and the character of the manipulation in the oven. The proportion of carbon and volatile matter in two coals may be nearly identical, yet they make cokes of very different quality. Big Muddy coal has those elements in near the same proportion as Connellsville, yet the coke therefrom does not compete with the latter. The coals of the Tennessee field have been classed as bituminous and semi-bituminous, but with one exception those coals that are low in bituminous matter do not go near so low as Cumberland, Blossburg, Quinimont and Pocahontas, while the Poplar Creek coal has one-third more volatile matter than Connellsville, but makes a coke approximating that standard. It is possible that with proper oven manipulation an equal product might be obtained. At the same time the Sewanee, with only a slightly less volatile matter and little more carbon, does not make so good a coke by some degrees of excellence.

The possibilities of a first-class coke in Tennessee are probably to be derived from a mixture of coals rather than any one coal. It may be assumed that any character of coal but cannot make some kind of coke. Every one who finds a new coal mine proceeds to have a little coke made by a chemist, or in some rough oven, and proclaims that the long-desired want is to be supplied. Instead of sending a carload or two to some coke works in operation, if any at all is sent it is seldom more than a barrel. Ovens are erected and money is expended on this shallow foundation, and, when failure results, the blame is attributed to some other cause than want of proper forethought.

Taking the Sewanee as a type of one class of coals and the Poplar Creek as another, the first having a little too small a proportion of volatile matter and the second too much, while the latter has a very small proportion of ash and the former a large quantity, it is fair to assume that a mixture of these two would make a coke approaching to the standard. Take, for instance, their analyses:

	Vol. mat.	Carbon.	Ash.
Poplar Creek.....	35.56	60.67	1.75
Poplar Creek.....	39.33	56.130	5.81
Sewanee.....	25.41	62.00	10.92
Sewanee.....	29.90	63.50	6.60
Average.....	32.805	60.57	5.498

The analyses of Poplar Creek are by Potter & Riggs and by Regis Chauvenet, both of St. Louis. The last one of Sewanee is probably from a picked specimen. It is seen, however, that this mixture makes a coal very nearly approaching Connellsville in its constituents. Whether it would make a like coke remains to be proven. The trial has never been made, notwithstanding the fact that these seams of coal are at many places not over $\frac{1}{2}$ mile apart. At Coal Creek the owners of the land, who lease to operators, erected four ovens for experimenting in the manufacture of coke, with poor results. Yet this Sewanee seam is not over 100 yards from the ovens, and no attempt was made to test the mixture of the coals. Without further comment on this or other instances of lack of proper enterprise, it is a pleasure to

be able to state that a majority of the stock of this company has now been purchased by enterprising New York men, and there is no doubt but a new state of affairs will be inaugurated.

Last some of my Pocahontas friends should take offense, I state that I have not yet come to discuss that coal and coke. In fact, it is hardly in the field of which I am treating, yet is rapidly earning its way into use there and elsewhere, through low first cost and cheapness of transportation, as well as its own general excellence. H. E. C.

Alabama Coke.

There is nothing like competition as a perfecter of industrial processes. The further the comparatively inexperienced iron men of the South ship their product, and the more they have to try conclusions with the Northern furnaces, the more they learn, or the more they find out they need to learn, about iron making. Obviously the best assurance of their making headway North and West lies in bettering the working of their furnaces, producing a larger proportion of high-grade iron, and naturally, therefore, the character of their materials is receiving more and more attention.

In the case of their coke this study has recently been stimulated by the unsatisfactory issue of the Cedartown, Ga., furnace's experiment with coke, and its almost enforced return to charcoal, for this result is attributable mainly to the quality of the coke used, an excess of sulphur being the particular property that is most generally blamed.

This coke is a pioneer attempt with Broken Arrow coal, a material from which experience will doubtless produce a better article. But as yet it seems that no very good coke has been burned east of Red Mountain, which divides the Birmingham mineral district. The ovens about Birmingham do not furnish an unexceptionable fuel, but in their case sulphur is not the excessive constituent, as their coke usually shows considerably less than 1 per cent. of it—some of it averaging little more than half of this percentage. The most serious fault there, it seems, is in the handling of the coal. More careful elimination of slate, pyrites and other foreign matter, by washing or otherwise, would doubtless be rewarded by a considerably better product; and it seems that, with this trouble corrected, the Birmingham furnaces would have a fuel the excellences of which would go far toward offsetting even the greater density and other points of superiority of the Connellsville coke.

The following analyses of Pratt and Connellsville coke by the same chemist will not be uninteresting to iron men:

	Pratt.	Connellsville.
Fixed carbon.....	88.45	87.45
Ash.....	9.95	11.33
Moisture.....	0.64	0.49
Volatile combustible matter.....	0.96	
Sulphur.....	0.99	

The ash included in the above analyzed as follows:

	Pratt.	Connellsville.
Silica.....	42.045	47.000
Alumina.....	30.950	47.000
Susquioxide of iron.....	24.830	1.490
Lime.....	1.860	1.490
Magnesia.....	0.190	0.590
Sulphur.....	1.370	
Phosphoric acid.....	0.007	0.510
Potash, undetermined matter and loss.....	0.546	0.069

A very recent analysis of Pratt coke showed:

Ash.....	8.667
Sulphur.....	0.856
Phosphoric acid.....	0.032

with the ash constituted mainly as follows:

Silica.....	3.370
Alumina.....	3.510
Ferric oxide.....	1.152

Belgian Iron and Steel Statistics.

The official statistics for the first half of the year 1885 for the Belgian iron and steel works have just been published:

	First half 1885, metric tons.	First half 1884, metric tons.
Coal.....	9,162,555	9,903,487
Lignite.....	214,156	245,042
Forge pig.....	642,411	721,247
Foundry pig.....	186,955	179,017
Merchant iron.....	332,795	354,147
Iron rails.....	1,468	5,738
Sheet iron and plates.....	59,829	60,964
Bessemer and open-hearth steel:		
Rails.....	182,084	195,230
Bars, &c.....	34,190	42,497
Plates.....	25,698	22,157
Puddled steel.....	7,716	6,920
Cement steel.....	8,246	1,370
Crucible steel.....	3,065	2,718

A decline, it will be observed, has been quite general.

Large Rolls.—At the Harleston Iron Works, Sheffield England, Watson, Moorwood & Co. have just completed one of four chilled rolls for a "Middlesboro" firm. These rolls are the largest of the kind ever turned out in the district, or perhaps in any other, the dimensions being 36 inches in diameter by 9 feet long in barrel; the weight, when turned, of each roll is nearly 17 tons. This particular roll was quite perfect, not the slightest speck or flaw being visible over the whole surface, and the chill was equal all round.

It appears from the experiments of M. Senff that the yield of crude pyrogenous acid, tar, charcoal and gas is almost the same with the most different woods. But the richness of the acid waters in acetic acid, and consequently the yield of dehydrated acid, varies greatly. In this respect the wood of coniferous trees is the least valuable. The wood of the trunk furnishes more acid than that of the branches. The wood yields more acid than the bark, and sound wood more than dead wood. Rapid calcination yields more gas at the expense of the condensed products and of the charcoal; it yields also the weakest acid waters, and the charcoal is more hygroscopic than that furnished by a gradual action.

It is reported from San Francisco that definite arrangements have been made by an English company for the maintenance of steamship service between that city and New Zealand, whence the Union Steamship Company will run steamers to Sydney.

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AND
Metallurgical Review.

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The Railroad Situation and the Iron Trade.

Since the settlement of the West Shore

trouble and the closing of negotiations for

the transfer of the Vanderbilt road in Penn-

sylvania, the adjustment of contending in-

terests among the leading trunk lines has

made slow, but substantial, progress. The

latest move—as yet not brought to a final

issue—is a compromise between the Penn-

sylvanian and the Baltimore and Ohio rail-

roads, which would remove one of the leading

causes of uncertainty as to the future. It

was generally feared that the contest grow-

ing out of the effort of the Baltimore and

Ohio Railroad to gain an independent en-

trance into New York would be a long and

bitter one. With two corporations wield-

ing so great a power and capable of so

much influencing business interests over a

large section of territory, the effects of

the struggle would be keenly and widely

felt. The most important feature, how-

ever, which negotiations of the charac-

ter alluded promises is that they show a

spirit on the part of railroad managers to

put aside personal animosities, to grant

concessions and do a good deal toward

bringing about a state of affairs more

favorable to the properties committed to

their charge. Only a few weeks since

amicable relations between the officials of

the Pennsylvania and Reading railroads

would have been thought impossible.

While it will be frankly acknowledged by

all that the railroad situation is far from

having reached a sound basis, it is impos-

sible to deny that a good deal is being

done toward improving it. A long time

must elapse before there will be business

enough to give all remunerative employ-

ment in handling that part of the traffic for which useless parallel roads were built. Until that period has come, very high rates of freight are out of the question, and there is always the danger that there may be a relapse to indiscriminate cutting. But, if the spirit

now generally shown continues to animate railroad managers, the future will be brighter.

The benefits accruing to business generally, and to the iron, steel and heavy hardware trades particularly, will be manifold.

We have in the past repeatedly dwelt upon the harm to trade done by the demoralization in freights. It has in some cases entirely wiped away, and in almost all quarters seriously disturbed, the legitimate boundaries of the producers in different sections. Sellers have turned up suddenly in markets in which they were unknown, bringing with them the low offers which every newcomer must present as an inducement. We have already had occasion to note more than once how the adjustment of railroad wars put a prompt stop to demoralizing influences of this kind. We believe that on the whole those who are thus closed out of territory they temporarily invaded do not feel much regret. Many have probably elected to sacrifice a surplus in distant markets rather than disorganize an assured home trade.

Another important reason why manufacturers and merchants regard with approval adjustments between warring railroads is that it holds out the prospect of more liberal purchases on the part of the latter. There can be little question that railroads, like individuals, have during the past few years been forced to the strictest economy, and it is asserted by those who are in a good position to know that the anxiety to avoid expenditures has gone even a good deal further. We have heard it stated that one railroad has actually put back into its main track iron rails which had been replaced years ago by steel, taking them out of the scrap pile. This is, of course, an extreme case, but it illustrates what has undoubtedly been done quite generally, viz., the limiting of repair work to the absolutely necessary. With better returns for the transportation of goods and of passengers, the railroads may be expected to become much better customers than they have been. The process will be a necessarily slow one, but it will tell in the long run, and will give better employment to a good many industries.

The Industrial Training Schools of Philadelphia.

The remarks which we have made on the Free Manual Training School established by the Board of Education of Philadelphia have prompted an inquiry into the facilities afforded in that seat of manufactures for industrial training of all kinds. Investigation develops the fact that quite a number of institutions now flourish in which industrial training forms a very important part of the course, in some cases constituting the leading feature. An enumeration of the principal schools is as follows: First, the Manual Training School conducted in connection with the public schools of the city. Second, the Industrial Art School of the public-school system. Third, the drawing and technical schools of the Spring Garden Institute. Fourth, the mechanical department of Girard College. Fifth, the industrial training department of the Institute for Colored Youth. Sixth, the School of Industrial Art conducted in connection with the Pennsylvania Museum. Seventh, the School of Design for Women.

We have already described the Manual Training School which the Board of Education has established at Seventeenth and Wood streets. The Industrial Art School of the public-school system is a different institution, albeit it is also under the supervision of the public-school authorities and instruction in it is equally free. This school was founded by Mr. Charles J. Leland, and is held in the public-school building on Locust street, near Fifteenth. For several years boys and girls have been instructed on certain afternoons in every week in designing, metal work, wood carving, &c. Hitherto it has been regarded as an experiment, but it has now been put upon a proper basis by the Board of Education, who have adopted regulations for its management in connection with the grammar schools of the city. Sessions will now be regularly held on Tuesday and Thursday afternoons of each week and on Saturday morning. It will be noted that a distinctive feature of this school is that both boys and girls are received. Every school in the city is entitled to send to this training school one pupil for each grammar division, who will be received only upon the understanding that he or she will attend for at least a full term. The course embraces drawing and designing, modeling in clay, wood carving, carpenter and joinery work and metal work. The metal work comprises the use and care of tools; the use of blast, forge, anvil and snarling tools; making and caring for cement; annealing and tempering; the shaping of vessels, plaques, &c., from sheets of metal, by hammering; drawing and graving the design on flat and curved surfaces; embossing and chasing on the flat and curved surfaces; working on cement. Certificates are granted to pupils who finish the whole course of study and execute an original design in clay, wood or metal to the satisfaction of the committee of the Board of Education exercising supervision over the school. A prominent member of this committee is Mr. Isaac A. Sheppard, the well-known stove manufacturer and iron founder. Although the course of instruction adopted for this school is mainly artistic in its nature, the training which pupils receive in the use of tools will be of

much benefit to them if they desire to become mechanics, and it is very probable that many of the boys who enter its classes will imbibe a taste for mechanical pursuits which will lead them to select such vocations for their life calling.

The Spring Garden Institute, a private institution, has up to this time been the most conspicuous industrial training school in the city. It is located on the northeast corner of Broad and Spring Garden streets, within a stone's throw of the Baldwin Locomotive Works. It was organized in 1851, maintained a library and reading-room from its foundation, with a winter course of lectures, supported evening drawing schools, then opened evening schools for primary education in reading, &c., and in 1878 introduced manual training, for which it was found necessary to establish day instruction. The prospectus of the Institute for the season of 1885-86 is very elaborate, embracing courses in mechanical drawing, freehand drawing, architectural drawing, modeling and wood carving, painting and designing, mechanical handiwork, principles of mechanics, geometry and physics, metallurgy and chemistry. The staff of instructors embraces 11 specialists, with three vacancies to be filled. The drawing schools provide thorough instruction for those who desire to study art, and the technical schools furnish equally thorough instruction to those whose tastes or necessities incline them toward mechanical pursuits. The course in the technical schools is intended to cover three years. Afternoon classes have been provided for those who cannot take the full course, and evening classes for those who are obliged to work in the daytime. The fees exacted from pupils are very low, the charges for night instruction being merely nominal, the institute not depending upon its patronage for its support. The manufacturers and business men of Philadelphia have contributed toward an endowment fund for the institute which almost supports it, the deficit being made up by donations from public-spirited citizens.

The mechanical department of Girard College has but recently been put in operation. This magnificent charity for orphan boys, supported out of the princely revenues derived from the estate of that practical philanthropist, Stephen Girard, has long been celebrated for the excellent education it provides for its inmates, and the trustees endeavor to keep it abreast of the age in every respect. Unhindered by a restricted income, they are in a position to inaugurate expensive experiments of new theories of education, and test their advantages thoroughly. The mechanical department of the college is their latest addition to the course of instruction, and for it they have erected a special building and provided competent tutors. The trustees hope in this way to overcome the decay of the apprenticeship system and to start their graduates in life with a training which will enable them at least to gain a livelihood in this industrial age.

The Institute for Colored Youth, located on Bainbridge street, near Tenth, has done a noble work for the colored race during the many years of its existence. Its managers are endeavoring to increase its usefulness by providing mechanical training for its students. There is no reason why a negro should not engage in some mechanical pursuit if he has the inclination to practice it, but it is a lamentable fact that he seems to have a very humble part to play in our industrial fabric.

The school of industrial art which is conducted in connection with the Pennsylvania Museum owes its origin entirely to the increased interest in art and art education which was awakened by the Centennial Exhibition. The people of Philadelphia subscribed a fund of \$50,000 during the exhibition, with which to purchase exhibits which were to be as largely as possible illustrative of the application of art to industry. The intention was to found an institution similar in its general features to the South Kensington Museum of London. The custodian of the art treasures thus collected was a corporation organized under the name of the Pennsylvania Museum and School of Industrial Art. After the close of the exhibition the purchases made for the museum, as well as a number of valuable collections which had been donated to the society, were placed in Memorial Hall, in Fairmount Park, which was devoted to that purpose by the State and municipal authorities, who control it. The museum now possesses a collection of great value, both intrinsically and to students of art. Its industrial school was opened in the winter of 1877-78 in temporary rooms in Industrial Art Hall, at Broad and Vine streets. Thence it was removed to the rooms of the Franklin Institute, on Seventh street, below Market, thence to 1779 Chestnut street, and in 1884 to the building it now occupies, 1336 Spring Garden street, opposite the Spring Garden Institute. Up to the time of the last removal the work of the classes in this school was confined to general courses in drawing, painting and modeling, with constant regard to the needs of the industries, it is true, but without attempting to provide instruction in any of the occupations themselves which it was hoped would be most directly benefited by the training which the students received here. The co-operation of the Philadelphia Textile Association was secured in 1884, and a school of weaving and textile design was opened for practical instruction, with both day and evening classes. Machinery was generously

donated to the school by prominent American manufacturers, so that the use of hand and power looms could be taught. Designs are made by the students for carpets, rugs, damasks, worsted dress goods and other classes of woven fabrics from the simplest to the most ornamental. The ladies of Philadelphia have taken a deep interest in this institution, and much of its present success is due to their unceasing efforts in its behalf. The tuition fees are very low, while the instruction imparted is of the highest order both in the artistic and mechanical departments. A pamphlet has recently been issued by the Committee on Instruction, which is profusely illustrated with cuts, showing the skill attained in drawing and designing by the pupils.

The School of Design for Women is located at Broad and Master streets, occupying the dwelling erected by Edwin Forrest, the eminent tragedian, which has, however, been greatly extended and improved. Instruction in it is purely artistic, as its name implies. In this age, however, mechanical and artistic pursuits are so interwoven that art work is a necessary accompaniment of many industries, and a school of this kind is essentially an industrial institution. The students do not merely acquire an accomplishment, but in the majority of cases they prepare themselves for earning a livelihood in making articles which are now regarded as essential to the adornment of innumerable American homes. The artist is an important member of the great family of Americans who earn their bread by unceasing toil with hand and brain.

The foundations have been laid in Philadelphia for the training of coming generations in useful pursuits. Upon the ruins of the apprenticeship system has arisen a more comprehensive method of educating youth in industrial matters, and the mechanics of the future will be a broader-minded and more thoroughly-educated class than those of the past. These schools will grow more and more rapidly as their advantages become apparent, and their pupils will eventually number thousands where they now count only their hundreds. The character of the work which is turned out by the workshops of the city must also improve in design and execution, and its value will certainly be enhanced. Much is to be expected from these schools, and all praise is due to the public-spirited and far-sighted citizens who have interested themselves in establishing this new system of educating youth.

American Interests in the East.

The possible reopening of the Eastern question by recent events in Bulgaria and Roumelia leads us to consider American interests in this matter, so vital to the peace of Europe. Our direct trade with Turkey does not amount to much, as the following table for the fiscal year 1885 shows:

From Turkey. To Turkey.

European Turkey.....\$850,631 \$419,666

Asia.....2,036,799 481,779

African.....236,470 549,442

Total.....\$3,123,900 \$1,450,887

Our chief imports from Turkey are wool, rags and fruit. Turkey may, however, receive considerably more American goods than the above figures indicate indirect via Malta and Gibraltar; this applies, we believe, chiefly to New England rum and to petroleum. Many small cargoes of both or either call at a Mediterranean port for orders, being most of the time the property of Greek merchants who transact a large share of the business Turkey does with the outside world.

Although none of the disputes recently patched up, or to be patched up, for the present concern us directly, they do so indirectly in many ways, since it so happens that most of the nations interested are competing producers. India in cotton and wheat, and Russia in the latter and petroleum, are about the most important present and prospective competitors of ours in these lines of production. Russia is naturally restless, cooped up toward the south, where a natural and handy outlet is denied her so long as Turkey holds the Dardanelles. She also needs another outlet in the Gulf of Persia. That, with her rapidly increasing population and resources, she is not likely to allow herself to be forever hampered in directions of vital importance to her material interests is certain, and the first and primary obstacle in the way is Turkey, evidently condemned sooner or later to be kicked out of Europe and transferred to Asia Minor. The question which really concerns us just now is whether Russia will attain her object peacefully, or whether a European war on a gigantic scale will be needed to bury the Sick Man. In the latter case we might expect a great increase in our trade and commerce, as the nations concerned would be so fully occupied by the formidable task before them that the field would be practically in our own hands. A great impetus would be given to our industries, and the slow, but healthy, awakening of the past few months would be quickened. We do not desire a war in Europe, but if it comes we shall be prepared to supply the combatants impartially with the produce of our fields and factories, and at the same time we can thank our lucky stars that we are at a safe distance from the scene of conflict, and that no entangling alliances can drag us into it.

The English trade papers which reach us during the past week confirm the suspicion expressed upon the receipt of the news of the first advances there that they were due very largely to the belief in sensational reports from this side of the water. Fully two months ago highly-colored reports of the wonderful recovery of the iron trade in this country began to make their appearance in some of the leading English provincial newspapers. Their origin is perhaps easily accounted for. Correspondents here, in no way familiar with the iron trade, believed without questioning them the exaggerated reports emanating principally in Pittsburgh, and drew upon a heated imagination for an elaboration. It is only too evident that many of our English friends believed that we were in the first stages of another boom. The correspondents here of English and Scotch firms have been bombarded with dispatches during the past few weeks, and the evidently unsatisfactory replies have probably for a time been received with much hesitation as to their accuracy. They have now, however, apparently realized how much they were mistaken, and speculation seems to be ebbing away.

There is no doubt that grave mistakes have been made in believing the misrepresentations concerning the state of affairs in this country, but, independent of any effect that it has had upon English markets of iron and steel, there has undoubtedly been an improvement there. From all accounts its character is very much like that which has been noted on this side of the Atlantic. There has been more inquiry, the downward tendency has been checked, and has in some instances been reversed. The *Ironmonger*, whose views on the subject are happily conservative, says:

Producers, who a few weeks ago were full of forebodings as to the blackness of the outlook, now profess to have the utmost confidence in the future, although the conditions now and a month ago are almost identical. On the other hand, consumers and other buyers are being worried by the reports in circulation, and are very much inclined to buy forward, even if they have not already done so, to the utmost extent allowed by vendors. We have, in short, rather suddenly come upon a period of uncertainty and unrest, during the continuance of which it is very difficult even for men of much experience to satisfy themselves that what they do is right and best under the circumstances. That being so, the general disposition is to make a full examination of all the factors in the problem, so as to ascertain, if possible, whether the present improvement is merely the spurt usually occurring at the period of the year, or whether the current changes are the forerunners of other and greater alterations. Prices are tentatively or actually higher all round in respect of crude iron, while sheets and one or two other kinds of finished iron are distinctly dearer. Further, manufacturers are filling up their order-books—some rapidly, others slowly—and seem to feel certain that at no distant date they will be in a position to stand out for more money. So far, then, as the actual amelioration of the present is concerned, it may be safely admitted that there is a spurt, and that such spurt has stiffened selling values. As to whether the improvement is likely to be emphasized, we must go deeper and extend the area of our inquiries. Primarily it is of much importance to learn the exact condition and prospects of the United States market. Taking the best sources of information at command, we find a consensus of reports from all parts of the States speaking of a much larger volume of business, and the existence of a confident impression that a capital fall trade is assured. Thus much may be conceded, but it has also to be noticed that up to the present time very little change in values has taken place in American iron or hardware staples. There, indeed, as well as here, a process of filling-up has to be completed before prices can be materially augmented. In the States this leveling-up appears to be in active progress; here we are going on less rapidly. In both countries, however, the question is whether the dormant means of production can be brought into action as quickly as the expansion of the demand proceeds. As regards the States this is subject to doubt, inasmuch as there are climatic reasons why much of the winter business must be transacted in the fall. In this country there is no such necessity; consequently, the natural inference is that the improvement in America is likely to go on more rapidly than the spurt here, and that the means of production in this country are in all probability quite equal to the demands likely to be made upon them.

There are some points in this reasoning which call for some modification. The opinion is expressed—one which is still shared by many in this country—that climatic conditions lead to a crowding of a large amount of business into a few fall months. We question whether this is the case to nearly the extent that it was years ago. The closing of navigation is not today the great event which it was. Improved railroad facilities and the heavy decline in rates have made buyers in the interior more and more indifferent to heavy purchases in the fall. Knowing that they can procure goods without unreasonable delay during the greater part of the year, they are not so much inclined to take risks in making heavy purchases, except, of course, of those goods which are distinctly seasonal. Buying is therefore more uniformly distributed, and therefore a good volume of business is done over longer periods. So far as the effect of climatic conditions upon the bringing out of reserve capacity in the iron and hardware trade is concerned, we fail to understand its importance. It takes very little more time, if any, to start a mill or a factory in winter than in summer. The business situation to-day is sufficiently clear to have silenced all "boom" talk, and the hopes of those engaged in the iron and allied trades centers in the question whether the gain thus far made will be maintained throughout the winter months. As for the prospects of any increase in the volume of orders from us to producers in Great Britain,

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our friends may as well promptly dismiss the thought. Our capacity is so far in excess of current requirements, and so much of it is ready for work as soon as any substantial advance has been secured, that it will take a phenomenal increase in the demand to force importations.

An exceptional step has been taken by the Government in sanctioning the appearance of the United States as plaintiff in an action at Memphis against the Bell Telephone Company for the nullification of the Bell patents. The ground on which this action is said to have been taken is that there was fraud in the manner in which the patents were granted, officials in the Patent Office being in collusion with the inventor to allow him to modify his claims to include points covered in an application by a rival inventor pending before the department. It is charged, furthermore, that the fact that these accusations were made on the part of the Government was withheld from the public by the suppression of the news through the instrumentality of the Western Union Telegraph Company, which has business connections with the Bell Company. It is stated that the case of the Government rests chiefly on the depositions of the very officer through whose fraudulent practices the Bell Company obtained prior patents. On the other hand, grave charges have been made against leading Government officers, who, it is stated, are deeply interested in rival telephone companies. The Department of Justice, through District-Attorney McCarey, authorized suit to be brought at Memphis on the petition of a number of persons interested in the National Improved Telephone Company. It appears now that a number of leading Government officers are the principal stockholders in another concern, the Pan Electric Telephone Company, which have taken advantage of the proceedings at Memphis to ask for postponement of suits pending in Baltimore. The evidence so far adduced does not give much color to these charges. What the merits of the case against the Bell Company are will probably be developed only during the trial. It is certainly premature to give so much credence to the affidavits of a Government officer who has from his own testimony confessed his participation in an alleged fraud. Aside from the wide interest the case will command through the importance of the invention involved, it will be followed closely, because it is one of the first of any importance in which the United States has taken action to annul a patent granted by it.

The happenings during the past week at the Cleveland Rolling Mill Company's works and at the Laughlin mill, near Martin's Ferry, Ohio, are well calculated to cause agitation in the iron trade. At the first-named works the wages conceded are the outgrowth of the advance in wire, which has been steadily gaining ground for weeks, and which is as much due to the long idleness of the very mill at which the strike occurred as to the higher prices now generally prevailing on wire rods. The excesses at the Laughlin mill are due to the exasperation of the nailers at the determined efforts of the manufacturers in the Wheeling district to run nail machines without the striking nailers. The situation in the Western nail works is fast approaching a crisis, and the midnight assault upon the men and managers who were exercising their undoubted right to work if they chose, proves that the turbulent part of the striking workmen were becoming fearful that their cause was lost. They have disgraced the majority of their fellow-workmen, and have alienated from them any sympathy which their cause may have commanded. Attacks by bands of armed men do not decide questions of wages. They simply lead to the doubling of guards, so far as the manufacturers are concerned. Workmen who are willing to accept wages tendered are swayed much less by threats of this character than they are by the odium that attaches to the appellations of "black sheep," &c.

Theory Versus Practice in the Bessemer Process.

To the Editor of The Iron Age.—SIR: There is no metallurgical process wherein there is such diversity of opinion in regard to theory and practice as the Bessemer. Theorists are ever and always ready to explain every phenomenal occurrence, and in less time than it will require to read these few lines he will have his ideas couched in the most exquisite and precise language, and in his theoretical mind he wonders why some people are so stupid. On the other hand the hard-headed and practical-minded practitioner cannot for the life of him see the use of anything so mythical as "theory." Now I do not wish the reader to infer from the above remarks that I am in favor of either of these extremes, for I fully believe that the one without the other will prove entirely worthless, particularly in the manufacture of Bessemer steel.

Take, for instance, a chemist who thoroughly understands the theory of the Bessemer process; put him in the mill in direct charge of the conversion, and, ten chances to one, he will prove a decided failure unless he has had some practical experience. On the other hand, take from the mill a "practical" blower and give him full charge of the conversion, from the raw material to the finished steel, and his chances of success will be equally as small as the former. There is no doubt whatever but that the many failures to produce the desired results are

brought about by having too much theory on the one hand and too much practice on the other. The chemist may be a first-class metallurgist who thoroughly understands the theory of the Bessemer process from the blast furnace to the finished steel, but if anything unusual occurs in the process of conversion the chances are that he will not know where to look for the cause, be it whatever it may. So the only course left him is to assign the cause to the inability of some of the workmen, or to those that other course that has proven so disastrous to the success of the Bessemer process as well as to many a manufacturer, to wit: freaks of the process.

Most, if not all, of the failures that are encountered in the Bessemer process are either due to false theories or "practical" ignorance on the part of the manager or some of the workmen in the converting department. For instance, according to the theory advanced by many, a like amount of manganese would give the same results in all steel, regardless of the circumstances surrounding its conversion. Now, this may be true in a general sense, but experience has proven beyond a doubt that when this theory holds good in one case it will not in another, which goes to prove that it is decidedly erroneous. There are many other theories advanced that are equally as erroneous as the one quoted. One is that cold heats work better than hot ones. Now, this is something that depends entirely on the circumstances surrounding the conversion, and any attempt to prove that this would be the case under all conditions would prove decidedly disastrous to the one attempting to do so. To advance a theory to explain a certain phenomenal occurrence in the Bessemer process is not a hard matter to do, but to advance one that will stand a practical test is something that I would not advise the student to indulge in, for if he does he will learn ere long that the road of the theorist is not a pleasant one, and that he is theorizing in the wrong direction. It is not only in the converting department that we find the theorist, for we often encounter him in others. Connected with the Bessemer you can find him at the head of the blooming and finishing departments, ready to advance his nicely-planned theories or attempting to surprise the mechanical world by his wonderful feats in engineering, which he usually succeeds in doing, but not, however, until he has erected a blooming or structural mill that shall stand as a monument to his theoretical ability.

The great reason why the Bessemer process has been condemned so often is simply because so many managers think that there is nothing connected with the process that requires any more than ordinary ability to understand; consequently, they believe that any person with a little theoretical knowledge or ability can succeed as well as it is possible. And, if at times failures take the place of success, they consider it one of the many necessary evils connected with the process. They appear to hold that it makes little difference what kind of a manager, chemist, blower, &c., they employ, so long as he can be had at a low salary. If it is at all necessary to have a manager, chemist, blower, &c., it is necessary to have a good one, and if it is necessary to have a good one it is likewise necessary to keep him, even if you must pay him a little more than you think he is worth, for you are not apt to fully know what he is worth until after he is gone and an inferior one takes his place. Then you find out after it is too late that he is worth just a little more than you thought he was. The sooner these erroneous notions are eradicated from the minds of owners of Bessemer steel plants the sooner will the Bessemer process take the place it is justly entitled to.

I do not wish the reader to infer from these few remarks that I believe that in order to become proficient in the art of managing a Bessemer steel plant one must necessarily work in the mill. But I do believe that it is necessary to thoroughly understand the process of conversion in every particular from the raw material to the finished steel. He must not only know how it ought to be done, but he must know when it is being done properly, and if it becomes necessary he should be able to do it himself in order to instruct those who do not know. I am not radically opposed to theory, for I do hold, and always have held, that theory is necessarily the forerunner of practice, for we know that an idea must first be conceived in the mind before it can be put in practice. Henry Bessemer first conceived the idea of forcing air through molten iron—at least he was first to make it a practical metallurgical success—but Mr. Bessemer was not the kind of theorist I speak of, for if he had been he would have been satisfied in his theoretical mind that he knew how and all about it without going to the trouble of experimenting and ascertaining whether or not his ideas were practicable. If capitalists who have their money invested in Bessemer steel plants would give this matter a little more attention, perhaps they would find why their mills are either idle or running full time and barely making expenses.

S. McDONALD

BENWOOD, September 26, 1885.

Eastern Manufacturers and the North Chicago Blast-Furnace Practice.

To the Editor of The Iron Age.—SIR: Noticing the communication of W. J. Taylor, of Chester, N. J., a gentleman who has given blast-furnace practice serious and intelligent consideration, I would say that he is no doubt right in his apprehension relative to the influence that the Chicago economy will have on the markets of the United States; and it is not a groundless fear when he says "the Eastern manufacturers may have to look out for their trade in competition with the Lake ores, under an economy of 1900 pounds of coke to the ton of iron." However, Mr. Taylor has overlooked the fact, or possibly does not recognize that it is quite as possible for the Eastern manufacturer as it was for the Western manufacturer to attain this most economical work.

It is fair to assume that, as the North Chicago Rolling Mill Company's furnaces had formerly all the best appearances at their command with which they afterward did

achieve the economy, there is as much in the operation of the furnace as in the plant itself. With these two combined it is easy to achieve the best work, and any intelligent furnace manager should, when once imbued with the truth of the theory which led to the Chicago practice, accomplish the same economical results.

Although it has been contended that superheated air is not of much advantage, it is an indisputable fact that the South Chicago economy could not have been accomplished without it. Very respectfully yours,

FRED. W. GORDON.

PHILADELPHIA, September 24.

WASHINGTON NEWS.

(From Our Regular Correspondent.)

WASHINGTON, D. C., September 29, 1885.

The steel-plate manufacturers have filed a number of protests against the enforcement of the rule laid down by the Board of Supervising Inspectors, of which General Dumont, Supervising Inspector-General, is chairman, requiring 70,000 pounds tensile strength. The manufacturers complain that they cannot comply with the rule, as it is impossible to attain so high a tensile strain and maintain the general quality of the metal, as the large use of carbon makes the metal brittle, and therefore entirely unfit for boiler purposes. It is asserted that the tensile strength used on all Western river boilers is less than 70,000 pounds, and by long experience has been proven amply sufficient for all purposes of safety and strength. The manufacturers ask to be permitted to get what strength they can, at the same time giving the quality of steel required. The subject is under advisement at the Treasury Department. It is probable that some modification of the rule will be allowed.

PROTECTION IN VIRGINIA.

The question of protection is becoming a prominent issue in Virginia politics. The farmers, ironmen and oystermen have been feeling the general depression of trade and a poor market and low prices for the products of their toil. They attribute this state of things to the agitation of a revision of the tariff, and declare that they will consider their business interests as paramount to politics and will vote accordingly. This feeling is reported as particularly strong in the counties of the Northern Neck and the Valley of the Shenandoah. The opening of extensive iron-ore tracts and the growing enterprise in the mining industry have exerted a decided influence upon public sentiment throughout the Old Dominion Commonwealth. The talk about free raw materials, iron ore being suggested as belonging in that category, has excited great distrust of the ultra wing of the old Democratic party in the State, and many voters of influence are showing unmistakable signs, according to the views expressed by prominent Virginians visiting this city, of surrendering former political affiliations for the sake of preserving the status quo of the tariff of 1883.

FREE INTERCOURSE WITH MEXICO.

It is ascertained through members of the Mexican legation that a movement is on foot among merchants and others on both sides of the frontier, and interested in freer intercourse between the United States and Mexico, to secure more liberal treaty arrangements and legislation, so that the products of the two countries may enter either way without being subjected to the rigid restrictions which now prevail. The Congress of Mexico passed a new and revised customs law and tariff last year, which went into operation on July 1. This was intended largely to adapt the customs regulations of that Republic to the new conditions on the Rio Grand frontier consequent upon the construction of international lines of railroads. An effort is now proposed from Mexico, supported by citizens of the United States, to secure some more favorable legislation on the subject by the Congress of the United States during the coming winter. The great obstacle to such legislation will be then, as it has been hitherto, the abuse of liberal laws by illegal introduction into the United States of products of other countries entering through Mexican ports.

STEEL INVESTIGATING COMMITTEE.

The committee of the House of Representatives on the investigation of the steel-producing capacity of the United States, of which Mr. Randall is chairman, is not likely to have his services, despite the delay since last spring so as to accommodate him. Mr. Hewitt, of New York, is next on the committee, but, as Mr. Randall had given the subject particular study and attention, the committee preferred to wait until fall rather than lose his services. The health of Mr. Randall is no better, and his friends think, not as good as it was when Congress adjourned in March. The committee was to commence its work in October, and will doubtless begin operations very soon. The information sought after will be especially useful in the coming Congress, as there is some prospect of an abandonment of the niggardly policy in regard to the navy, defenses and armaments which has dominated the House of Representatives for the past four or five years. At present information on the subject of the quantity and quality of steel manufacture in the United States is limited.

ENGLISH SUGAR MEN AT THE DEPARTMENT.

The Treasury officials were somewhat surprised a few days ago by the appearance at the department of a committee representing the sugar refiners of England, protesting against the department methods of enforcing the law relating to sugar. They asked a reduction of the rebate granted to American refiners under the statutes, and that a higher schedule should be adopted. The committee were well received and had a cordial hearing. Whether any action will be taken in their case will depend upon the facts which they offered to prepare and submit to show a violation of the law. It is not probable that the department will go much out of its way to accommodate the sugar refiners of England, but it will correct promptly any violations of the law if they exist. The disposition of the department has thus far been

rather favorable to a strict construction of the tariff statutes in regard to all articles, without regard to politics or preference.

SECRETARY MANNING'S CIRCULAR.

It appears from correspondence in the Treasury Department that the principal cause of the hesitancy on the part of the manufacturers of the United States in making their responses to Secretary Manning's tariff circular is the purpose to put down tariff agitation by using their influence against tariff revision. While the tariff act of 1883 is not perfect in all respects, those interested in trade and manufactures are anxious to have matters rest as they are, hoping that the prospects of a revival of business may be encouraged and stimulated rather than repressed or alarmed by the uncertainty which always attends an agitation of so vital a question as tariff revision. In a number of cases answers have been received or are promised, but they deprecate, as a rule, giving the tariff agitators in and out of Congress any grounds to think that the Administration is also tainted with the so-called reform hobby. In some cases the interrogatories have been answered hypothetically. No one seems to be willing to open his private business to every tariff-bill producer who wishes to get off a little buncombe for the benefit of his constituents.

RECENT CUSTOMS DECISIONS.

The following is a synopsis of sundry decisions rendered during the past week in customs cases by the Secretary of the Treasury:

Pruning-knives, so called, which are found to consist of pruning-bills—that is to say, heavy steel blades, crooked or curved at the ends, from 6 to 8 inches long, and fixed stationary in wooden handles—do not come within the category of "cutlery," but, being otherwise unenumerated, are dutiable at the rate of 45 per cent. ad valorem, under the provisions (T. I., new, 216) for articles composed wholly or in part of steel.

Iron and brass bedsteads are dutiable at the rate of 35 per cent. ad valorem, under the provisions in Schedule D, T. I., new, 230, for "cabinet-ware[s] and house furniture, finished."

Magnetic sand, so called, but which, in fact, consists of magnetite iron ore from Marbella, Spain, is dutiable at the rate of 75 cents per ton, under the provision in Schedule C, T. I., new, 144, for "iron ore."

So-called "parts of clocks," which consist of, as an inspection of the samples showed, hollow brass wire or tubes, in pieces about 3 inches long, are dutiable at the rate of 45 per cent. ad valorem, under the provisions in Schedule C, T. I., new, 216, for "manufactures of brass."

"Japanesse metallico," so called, is not entitled to free entry as gold size, but, being a varnish which is used in connection with bronze powder, is dutiable at the rate of 40 per cent. ad valorem, under the provision in Schedule A, T. I., new, 119, for "varnishes of all kinds."

CHARGES ON IMPORTS.

The Secretary of the Treasury has decided that charges, as such, are no longer elements of dutiable value under the existing tariff acts, but the fact remains that their specification in invoices of imported merchandise is still required by Section 2854, Revised Statutes, which section was not repealed by the act of March 3, 1883, and therefore it is held that invoices should contain specification of charges in the same manner as heretofore.

Obituary.

DR. GARRETT B. LINDERMAN.

Dr. Garrett Brodhead Linderman, general manager of the Bethlehem Iron Company, died at his home on Fountain Hill, near Bethlehem, Pa., 28th ult., of congestion of the brain. Dr. Linderman was a son of Dr. John J. and Rachael Brodhead Linderman. He was born in Lehman Township, Pike County, Pa., October 13, 1829; graduated from the New York College of Physicians and Surgeons in 1847, and in 1856 married Lucy, daughter of the late Judge Packer. He became largely interested in coal operations. At the time of his death he was at the head of the Bethlehem Iron Company, president of the Lehigh Valley National Bank, a member of the Board of Control of the Bessemer Steel Companies of the United States, member of the Board of Directors Lehigh Valley Railroad, senior member of the firm of Linderman & Skeer and of G. B. Linderman & Co., coal operators; member of Board of Trustees Lehigh University and St. Luke's Hospital, and chairman of Wilbur Mining and Mfg. Co., of Ontario, Canada. Dr. Linderman leaves five children—Mrs. Warren A. Wilbur, Robert P. and Garrett B. Linderman, Jr., children by the first wife; and Misses Lillian and Ida, daughters by the second wife, Mrs. Evans, of Brooklyn, N. Y., whom Dr. Linderman married in 1880. Dr. Linderman was a brother of Henry R. Linderman, deceased, widely known as director of the Philadelphia Mint, and of A. B. Linderman, of the Florida Land Company.

PETER TOWNSEND.

Peter Townsend, the well-known iron merchant, died on Saturday morning at his home in East Twenty-third street, in his 81st year. Mr. Townsend was born in Chester, Orange County, N. Y., in 1803. His family lived there for more than 100 years on what is termed the Sterling tract, engaged in manufacturing iron. The great iron chain which was stretched across the Hudson River in the Revolutionary War was forged at this place by Mr. Townsend's grandfather, and the first cannon of any considerable size for the new ships in the War of 1812 by his father. At the age of 15 Mr. Townsend went into the office of Jacob Barker & Co., New York, bankers, and remained there until he succeeded to his father's business in Chester. He remained there for over 60 years, spending his winters in the city and his summers alternately in Chester and Southfield, Orange County. He leaves three daughters, Mrs. Crawford, Mr. Meagher, who is the wife of General Thomas Meagher, and Mrs. S. M. L. Barlow.

An English View of the Condition of Our Ironworkers.

A correspondent of the Manchester Guardian has been entertaining the readers of that newspaper with a gloomy picture of the misery of our ironworkers. Writing from Easton, Pa., he appears to have special reference to an alleged condition of affairs in that section. It may furnish an example of what is sent to English newspapers with the knowledge that it will be eagerly accepted. The story reads as follows:

The majority of the workers receive from 4/ to 4/10 a day. Men of exceptional skill get more; but many of the men are obliged to work 12 hours a day, though those doing the hardest labor are divided into three shifts, each working eight hours a day. The men have one day off in 14, so that 4/ a day means £5. 12/ a month, and 5/ a day means £7. The average workman receives about £6 a month, and out of this he pays £1. 12/ a month for rent for a house with from three to four rooms. He probably pays no more rent when, after years of service and after the acquirement of peculiar skill, he receives from £10 to £13 a month. From the remaining £4. 8/ he must pay for the food, clothing and medicines of his family. The food of a family of four—a man, a wife, and two children—will cost about £2. 16/. The man has £1. 12/ a month then for all other expenses. This is the case of the man who saves something. The food expenditure of the average man of this income would be £3. 12/. For four people £2. 16/ a month is nearly 1/9 1/4 a day. As the head of the family naturally saves the largest part of the fund for food, it is possible that the operative in a Bessemer steel mill, toiling before the fierce fires, and in constant jeopardy from white-hot ingots of steel, has a daily ration of from 7/4d. to 9/4d. Were he to spend all his earnings in food he could not have a chicken for dinner even once a month, and yet the secretary to the late Administration published to the world that American workmen fared sumptuously on roast beef or mutton twice every day, while the workmen of Europe did not enjoy such luxuries. A common dinner of the men in the steel works is composed of two or three cold potatoes and some scraps of unbuttered bread. To the working people of the Lehigh Valley fresh meat is a luxury. The most thrifty will keep a pig and grow cabbages in their little gardens, and these serve them with the principal articles of food in the winter. Men now receiving 4/9 a day are wheeling stock for the blast furnaces or taking charge of the furnaces. Two or three years ago they were puddlers, earning 16/ to £1 a day. The Bessemer process has killed puddling.

Wages were abnormally high at steel works when the rate of duty on imported steel rails was 45 per cent., and when domestic manufacturers were able to charge £18 a ton for rails like those sold in England for £11. 12/. But profits were proportionally high, and higher, for the price of labor dropped faster than the price of steel. The cut in the pay of skilled artisans has been enormous. A first vessel-man who, two years ago, made £28 a month, now receives £10 to £20 a month. A foreman heater in the steel mill receives from £10 to £20 a month. There have been times when such a man would get £2 a day, but those times are no more. In 1882 the price of anthracite pig iron in Philadelphia was, taking the average for the year, £5. 3/; in January, 1883, it was £5. 1/; in June, £4. 4/; in July, £4. 6/. At this the manufacturers began to save on the cost of production, and lowered wages from 10 to 20 per cent., and in some cases as much as 50 per cent. Thus profits could not have been materially reduced, for the price was only 12.5 per cent. lower than that of the year before, while labor suffered as stated. At the opening of 1884 the price of anthracite pig iron had fallen to £4. 2/, and the average for the year was £3. 19/2. Another reduction of wages was made in the summer of this year, and a great many operatives were thrown out of employment. Thus far this year the price has been £3. 12/. Many of the iron furnaces are closed, and whole hamlets are on the verge of starvation. The testimony of workmen is that the cost of living was never higher than it has been for the past eight months. The dwellings in which these ironworkers reside are for the most part four roomed wooden huts, facing dusty streets, and most of them as dirty and uncared for as the tenement-houses in large cities. The general rent is £1. 12/ a month. Sanitary regulations do not seem to be considered. Many foreign laborers are imported, chiefly Hungarians, who work for from 3/7 to 3/9 1/2 a day, and who live together in great boarding-houses where cleanliness would be a luxury. Of course there are some brighter scenes in these iron districts, where people endeavor to live "respectably"; but the average young workman who aspires to a "respectable" condition of living, and whose father may have saved a home out of 5/ a day, finds that it takes up all his income to live, and that he can save nothing with which to meet emergencies.

Messrs. Gordon, Strobel & Laureau, of Philadelphia, have concluded a contract with the Joliet Steel Company, by the terms of which they engage to reproduce at the Joliet furnaces the economical work reached at South Chicago under the advice of Mr. F. W. Gordon. This gentleman is to assume the direction of the blast-furnace practice at once, and it is expected that the guaranteed economy will be reached in from two to three months.

The Argentine Republic is constantly perfecting its system of railway transportation. In the Province of Buenos Ayres the railways employ 80 locomotives, nearly all from the United States. Four more were ordered lately, two of them from England and two from Germany, in the hope of "advantageous economic results." The management have begun to construct their own rolling stock.

An English syndicate has bought of B. Friedman, of Tuscaloosa, 50,000 acres of coal and iron lands in West Alabama, and promises to work them before long.

Index to Advertisements

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Trade Report.

New York Iron Market.

American Pig.—The week has been a quiet one. Those buyers who contract at this season of the year have covered their requirements, and the market is confined to the dealings of those who continue to purchase to cover immediate wants, or who consume small quantities only; 500-ton orders are becoming scarcer. It is reported that advances in freights are forcing Western makers to ask an advance of 50¢ a ton in the central part of the State. The market here is practically unchanged, so far as values are concerned. We quote standard brands of Lehigh and North River Irons, tidewater delivery, nominally as follows: No. 1 X Foundry, \$18 @ \$18.50; No. 2 X Foundry, \$16 @ \$16.50; Gray Forge, \$15 @ \$15.50; the outside figure is asked for special brands. Outside brands sell for 50¢ @ \$1 less than our quotations.

Scotch Pig.—The market continues dull. Mail advices confirm the suspicion held here that the recent advances of warrants in Glasgow were due to outrageously extravagant reports of an improvement in this country. We quote nominally as follows for round lots: Coltness, \$19.50 @ \$19.75 to arrive; Gartsherrie, \$19.50 to arrive; Shotts, \$19.50 @ \$19.75 to arrive; Carnbroe and Glengarnock, \$18.50 to arrive; Summerlee, \$19 @ \$19.25 to arrive; Dalmellington, \$18 @ \$18.50 to arrive; Eglinton, \$17.50 @ \$18 to arrive, and Clyde, \$18 @ \$18.50 to arrive.

Bessemer Pig and Spiegeleisen.—Spiegeleisen has been fairly active, and sales of different grades, aggregating about 8000 tons for delivery to Eastern and Western works, are reported at private terms. We quote for 20 % \$25.75 @ \$26, and for 10 % to 12 %, \$20.50 @ \$21. In Foreign Hematite there has been a sale of 1000 tons for open-hearth purposes. In American Bessemer contracts aggregating about 20,000 tons have been closed at figures which are no higher than transactions of a similar character some time since.

Iron Ore.—We note additional sales of 10,000 to 15,000 tons of Porman, Elba and Mokta.

Bar Iron.—There is a fair amount of business doing at unchanged prices. We quote for delivery here in round lots: Common Iron, 1.45¢ @ 1.55¢; Medium, 1.55¢ @ 1.65¢, and Refined Iron, 1.75¢ @ 1.9¢, with half extras. Concessions from these figures are very difficult to obtain. Store prices are 1.6¢ @ 1.75¢ for Common, 1.75¢ @ 1.8¢ for Medium, and 1.9¢ @ 2¢ for Refined.

Structural Iron.—A number of round orders for Beams have been taken. In other classes of Structural Iron the market is quiet. Angles may be quoted nominally 1.95¢ @ 2.1¢, delivered, for round lots, and Tees at 2.25¢ @ 2.4¢. Store quotations remain 2.2¢ @ 2.4¢ for Angles, and 2.5¢ @ 2.7¢ for Tees. American Beams and Channels are 3¢ base from dock for all orders.

Plates.—Plates are not as firm as they have been until recently, and concessions are more freely made. We quote for round lots: Common or Tank, 2.05¢ @ 2.1¢; Refined, 2.1¢ @ 2.2¢; Shell, 2.4¢ @ 2.5¢; Flange, 3.4¢ @ 3.5¢; Extra Flange, 4¢ @ 4.1¢. For small lots of Steel Plates the quotations are as follows: Ship, 3¢ on dock; Tank, 2.3¢ on dock; Boiler, 3¢ @ 3.1¢ for Shell, 3.1¢ @ 4¢ for Flange, and 4¢ @ 5.5¢ for Extra Flange and Fire-Box.

Merchant Steel.—Quotations for the range from ordinary to good grades are as follows: American Tool Steel, 7.5¢ @ 10¢; Tool Steel of special grades and fineness, 12¢ @ 20¢; Crucible Machinery, 4.5¢ @ 6¢; Spring and Tire, 2.5¢ @ 2.6¢; Open-Hearth Machinery, 2.5¢ @ 2.6¢; and Bessemer Machinery, 2¢ @ 2.5¢; English Tool, 1.5¢ @ 1.55¢; Common grades, 7¢ @ 9¢.

Steel Rails.—For delivery during the current year only one transaction of about 3500 tons has taken place. A mill in Eastern Pennsylvania has accepted a contract from a Kansas road for 12,000 tons, to be delivered from November, 1885, to November, 1886, at \$30 at mill. It is rumored that another contract for 16,000 to a Northwestern road, for delivery in February, March, April, May and June, 1886, has been closed. There has been some talk of shutting down during January next. The early months of the year are those most unfavorable to mills which do not have a Southern trade. Orders for delivery during these months are scarce, because few railroads are in a position to put rails into tracks. The cost of manufacture, too, is notably greater.

Steel Wire Rods.—The market has been quiet. We note a sale of a lot of 1000 tons and of a number of small lots aggregating a like amount. We quote \$40.50 @ \$41.50, the latter for small lots.

Old Rails.—We hear of no transactions. Spot lots are scarce and are in demand. We quote nominally, for early delivery, \$17.25 @ \$17.50.

Scrap.—The market has been quiet, with nominal quotations unchanged at \$18 @ \$18.50 for No. 1 Wrought iron yard.

Rail Fastenings.—We quote for large lots 1.85¢ @ 1.90¢ for Spikes; 2.55¢ @ 2.65¢ for Bolts and Square Nuts; 2.75¢ @ 3¢ for Bolts and Hexagon Nuts, and 1.65¢ @ 1.7¢ for Splice Bars.

Metal Exchange.

The following transactions have been reported as having taken place on the floor of the Metal Exchange:

5 tons Tin, December.....	30¢
SATURDAY, September 26.	
5 tons Tin, November.....	30.00¢
10 tons Tin, October.....	30.25¢
TUESDAY, September 29.	
200 boxes Tin Plates, spot.....	\$4.45

Philadelphia.

Office of The Iron Age, 230 South Fourth St., PHILADELPHIA, September 29, 1885.

Pig Iron.—The market is not an easy one to report, as the views of sellers vary considerably. Sifting the various statements which have been made within the past three or four days, it may be assumed that the general tendency is toward improvement. Holders of the best-known brands of Iron appear to have entire confidence in value, and in many instances are either offering very sparingly or asking a slight advance on last week's quotations. In another direction, viz., in outside and low-grade Irons, the position is just the reverse—in some cases quotations are unchanged, in others a shade lower. This may be accounted for in the first case by the large amount of orders entered for standard brands and the active demand for additional quantities. In the other case the weakness is because of a desire on the part of certain owners to blow in their furnaces and the endeavor to secure orders to start on. Then, again, Southern Irons are offered with more freedom; sales of Gray Forge at \$14.50, against \$15 asked a week ago, with some indications of a desire to secure buyers of large lots at possibly less than \$14.50 on firm offers. The position from the seller's standpoint is therefore a little mixed, but to buyers the market maintains an unusually strong appearance. Consumption is evidently increasing, and to keep pace with it there has been no adequate increase in the supply of such grades as are most wanted, viz., standard brands of No. 1 Foundry and Good Neutral Mill Irons.

The supply of No. 2 Foundry and of ordinary Mill Irons (chiefly from the South) is rather in excess of the demand; hence the weak and unsettled appearance of that class of Iron. With these conflicting elements in sight, it is difficult to see what the ultimate outcome will be, but the general feeling as regards standard brands is one of absolute confidence in current quotations. As regards the inferior and low-priced Irons, they have at the moment little or no influence on the general market, but the urgency for business may start up some of the Pennsylvania furnaces, which will check the advancing tendency in the better grades, unless there is still further increase in consumption. Sales have been on a liberal scale during the past week, and inquiries denote continued activity on the basis of \$18 at tide for No. 1 Foundry, \$18.50 @ \$19 for special brands, \$16 @ \$16.50 for No. 2, and \$15.50 for Gray Forge. Southern No. 3 Forge is offered at \$14.50, with 500-ton lots taken, but \$14 is about buyers' ideas for 1000-ton lots and more.

Foreign Iron.—The demand for Bessemer appears to be confined to small lots of special brands at \$20 @ \$20.25. No demand whatever for ordinary qualities. Spiegel has been taken to the extent of about 10,000 tons at \$25.50 @ \$25.75 for 20 %, holders asking about \$26 for additional quantities.

Muck Bar.—The demand is fair, and, as mills are well sold up, prices are firm at \$26.50 @ \$27 at mill, according to quality.

Blooms.—Demand slow; asking prices are about as follows: Soft Basic Blooms, \$33.50 @ \$35; Billets, \$38 @ \$39, and Siemens-Martin, \$40 @ \$42; extra quality, \$43 @ \$45; Domestic Blooms, \$30.50 @ \$32, delivered, for Nail Plate, and \$35 @ \$36 for Plate and Sheet Blooms; Charcoal Blooms, \$50 @ \$52; Run-out Anthracite, \$43 @ \$44; Scrap Blooms, \$34 @ \$35; Northern Ore Blooms, \$34.

Bar Iron.—The demand is fair, but somewhat irregular and rather disappointing to some of the more sanguine ones. Still, the tendency is toward better prices, and, if the volume of business is not as large as could be desired, it is sufficient to keep the mills pretty fully employed. Then there is an undoubted feeling of confidence which is likely to develop a better demand at an early date. Notwithstanding a little falling off in orders within the past 10 days, the month closes with prices firmly held at a slight advance, with a general belief that the coming month will bring with it still further improvement. Sales on the basis of 1.7¢ @ 1.8¢ for Best Refined Bars, and 1.55¢ @ 1.65¢ for Common and Medium qualities.

Plate and Tank Iron.—A very fair demand is reported, with prices a shade firmer. No specially large orders have been entered, but the mills are actively employed and have all they can do to make deliveries on time. Prospects are considered to be entirely favorable to manufacturers, and concessions from quoted rates are not considered in the present condition of the market.

Sales at about the following quotations, Ordinary Plate, 2¢; Tank, 2.1¢; Shell, 2.5¢; Flange, 3.5¢; Fire-Box, 4.25¢; Steel Plates, Flange, 3.5¢ @ 3.75¢; Fire-Box, 4¢ @ 4.25¢.

Structural Iron.—The demand is not urgent, but the mills have a good many orders on hand, and in some departments have all they can do to make deliveries promptly. Inquiries have fallen off within the past week or 10 days, but there is a considerable amount of business to come on

the market at an early date, so that there is no lack of confidence in regard to the ultimate outcome. Prices steady as follows: Bridge Plate, 2.1¢; Angles, 2¢; Tees, 2.4¢ @ 2.5¢, and Beams and Channels, 3¢.

Sheet Iron.—The demand shows no abatement, and mills are run to their utmost capacity to meet calls that are made on them. Stocks are greatly reduced, and by the close of the season are likely to be completely exhausted. Prices firm as last quoted, viz.:

Best Refined, Nos. 36, 27 and 28.....	33¢
Best Refined, Nos. 18 to 25.....	35¢
Common, 1/4¢ less than the above.....	5¢
Best Bloom Sheets, Nos. 36 to 38.....	4¢
Best Bloom Sheets, Nos. 22 to 25.....	4 1/2¢
Best Bloom Sheets, Nos. 16 to 21.....	4 1/2¢
Blue Annealed.....	2 1/2¢
Best Bloom, Galvanized, discount.....	50¢
Common, discount.....	62 1/2¢

Wrought-Iron Pipe.—The demand continues very active at the full prices recently quoted. Stocks are low, and manufacturers have some difficulty in filling orders promptly. Discounts as last quoted, viz.: Lap-Welded Black Pipe, 60¢ off list price; Butt-Welded do., 42 1/2¢; Lap-Welded Galvanized, 32 1/2¢; Lap-Welded do., 42 1/2¢; Boiler Tubes, 57 1/2¢.

Nails.—The continued heavy demand has had the effect of stiffening prices, and if the strike continues further advances are almost inevitable. Stocks are about at the lowest point ever known, and it is exceedingly difficult to fill orders promptly. The price is now \$2.40, less the usual discount to the trade.

Steel Rails.—The demand is very active and deliveries during 1885 difficult to obtain. Prices are higher, with large sales at \$30 at mill, and from that to \$31 for small and medium-sized lots. There are inquiries for lots aggregating over 100,000 tons, with every probability of a large proportion of them being taken soon as deliveries can be arranged. Meanwhile prices are firm as above quoted—\$30 @ \$31 at mill.

Old Rails.—There is an active demand for spot lots or deliveries early next month, but there are few such available. October shipments are offered at \$17.25 @ \$17.50, but buyers would sooner pay \$17.50 @ \$18 for immediate deliveries. Sales deliverable at interior points, \$18 @ \$18.50, and \$17.50 bid, spot, Philadelphia.

Scrap Iron.—The supply appears to be quite inadequate to the demand, and for prompt deliveries \$17.25 @ \$18, f.o.b. cars, is freely bid for good No. 1. Cargo lots have been offered for shipment, with \$17 bid. General quotations are about as follows: No. 1 Wrought Scrap, \$17.50 @ \$18; No. 2 do., \$12 @ \$13; Horse Shoes, \$22 @ \$23; Turnings, \$13 @ \$14; Old Car Wheels, \$13.50 @ \$14; Old Steel Rails, \$16; Fish Plates, \$22 @ \$23; Cast Scrap, \$13 @ \$13.50; do. Turnings, \$10 @ \$10.50.

Pittsburgh.

Office of The Iron Age, 77 Fourth Avenue, PITTSBURGH, PA., September 29, 1885.

There has been nothing new developed in labor circles the past week. The river coal miners are still out, and the nailers have not yet gone to work. With these exceptions labor is reasonably well employed, but the outlook for the winter is not very encouraging, as it is feared that orders will fall off later on.

Iron Ore.—The Ore trade, so far as relates to this district, presents nothing new. As none of the idle furnaces have yet been started up, the consumption has not improved much, and the outlook for the winter is not very promising, although it may do better than present appearances warrant. Furnacemen as a rule do not appear inclined to contract beyond their immediate wants, and the indications are that this policy will be adhered to for some time to come.

Pig Iron.—Commission men generally report no change in the general condition of the market, with the exception that trade is not quite as active as it was a few weeks ago. This, however, was not unexpected, in view of the fact that consumers generally for a time bought freely, and as a rule have fair stocks; some of them have contracted ahead from 30 to 60 days, and for the time being are out of the market. In other respects, however, the situation is favorable; a good many lots of odds and ends that have been hanging on the market for some time have been picked up, and, as but very few of the idle furnaces have started up, production continues light and stocks are slowly but surely being reduced. The consumption in this district has been in excess of the production for some time past, and furnacemen are hopeful of being able to realize better prices within the next month or two if there is no falling off in the demand for the products. As matters now stand, consumers are paying all they can afford to for the raw article, as there has been no improvement in prices for the products. We quote prices as follows:

No. 1 Neutral Mill.....	\$14.75 @ \$15.00, 4 mos.
No. 2 Neutral Mill.....	14.00 @ 14.25, 4 "
All-Ore Mill.....	15.00 @ 16.00, 4 "
White and Mottled.....	18.50 @ 14.00, 4 "
No. 1 Foundry.....	16.50 @ 17.00, 4 "
No. 2 Foundry.....	15.00 @ 15.50, 4 "
Charcoal Foundry.....	19.00 @ 22.00, 4 "
Cold-Blast Charcoal.....	23.00 @ 27.00, 4 "
Bessemer Iron.....	17.00 @ 17.50, 4 "

City furnaces are holding their No. 1 Mill at \$14.50, cash, and some of them, we apprehend, would hesitate about contracting for future delivery at that price.

Muck Bar.—There have been some sales recently at \$26.50 @ \$27, cash, which may be regarded as the market price for desirable qualities.

Manufactured Iron.—The general position of the market has not changed much from that of a week ago; the mills all appear to be pretty well employed, from which it is fair to infer that orders are still coming forward freely. It is feared by some that the demand will fall off before the close of the present year, but the outlook is regarded as being favorable for at least a fair trade until the 1st of January. The enhanced cost of Old Iron Rails, it is expected, will cause the mills out in the Shenango and Mahoning valleys to stiffen up on their products. We continue to quote prices on a basis of 1.60¢ @ 1.70¢ for Bars, 60 days, 2¢ off for cash.

Nails.—The situation here remains unchanged; there is no more prospect of the strike being brought to a close now than there was a month ago. Now that the best part of the season for the fall trade has passed, manufacturers are more indifferent about starting up, but so far as we can learn, there is no indication of any weakening on the part of the men, who appear determined to hold out until the bitter end. There has not been a Nail machine in operation here for almost four months; at Wheeling and other points along the river a number of factories have been started up non-uniform, but thus far no movement with this end in view has been attempted here. Our manufacturers appear indifferent, although, of course, they do not relish the idea of their customers being obliged to go East for supplies.

Wrought-Iron Pipe.—The Pipe mills continue very busy; but few of them are able to catch up with their orders. Prices firm, but unchanged. Discount on Black Butt Welded Pipe, in carloads and upward, 45¢; less, 42 1/2¢; Black Galvanized, in carloads, 35¢; less, 32 1/2¢; on Black Lap-Welded, in car lots and upward, 62 1/2¢; less, 60¢; Black Galvanized, do., 45¢; less, 42 1/2¢; discount on Boiler Tubes, 57 1/2¢; 2-inch Oil-Well Tubing, 13¢ 3/4 foot, net; 5 1/2-inch Casing, 40¢ 3/4 foot, net; 8-inch Drive Pipe, \$1.30.

Merchant Steel.—But little change to note in the situation; demand fair, prices without quotable change. Best brands Refined Cast Steel, 8 1/2¢ @ 9¢; do. Crucible Machinery, 4 1/2¢ @ 4 3/4¢; Open Hearth do., 2 1/2¢ @ 2 3/4¢. No demand for Nail Slabs, nor is it likely that there will be while the Nail strike continues. The last sales reported were at \$29 3/4 ton.

Steel Rails.—There is still considerable inquiry for small lots for near-by delivery, and sales have been made at still higher prices—\$30.50 @ \$31, cash, at mill. We are reliably informed that some small sales have been made within the past day or two at outside quotations. However, we have no doubt that orders would be accepted for delivery two or three months hence at prices considerably below those quoted, and it is only in a small way for immediate delivery that these extreme prices have been obtained.

Old Rails.—Old Iron Rails are hardly as strong as they were a month ago, when the market was a little excited, but prices are not off. We can report a sale within a few days at \$19.25, and, so far as we can learn, there are but few, if any, sellers below that figure. Old Steel Rails are still quoted at \$17 @ \$18, according to lengths.

Railway Track Supplies.—Prices remain unchanged. Spikes, 1.90¢, 30 days; Splice Bars, 1.60¢ @ 1.70¢; Track Bolts, 2.75¢ @ 2.85¢.

Crop Ends.—New Steel Rail Ends may be quoted, in the absence of sales, at \$18.25 @ \$18.50, and Steel Bloom Ends at \$17.75 @ \$18.

Steel Billets.—Rumor has it that a contract for 3000 tons of Steel Billets was closed recently at \$29 3/4 ton.

Scrap.—There is a continued fair degree of activity, but no improvement in prices; dealers complain that prices here are low as compared with other points. No. 1 Wrought Scrap may be quoted at \$16 @ \$17 3/4 net ton, outside figure for Selected Railway; Wrought Turnings, \$13 @ \$14; Old Car Axles, \$22 @ \$23; Cast Borings, \$10.50 @ \$11, gross ton; Old Car-Wheels, \$14 @ \$14.50, gross.

Window Glass.—There was a conference last week between the manufacturers and blowers, but no understanding was arrived at, and the factories still remain idle. Prices unchanged. Discounts on Single-Strength, in car lots and upward, 70 and 10¢; Double-Strength, 75 and 5¢.

Coke.—Blast-Furnace Coke remains unchanged at \$1.20 3/4 ton, free on cars at ovens.

Chicago.

Office of The Iron Age, 36 and 38 Clark St., Cor. Lake St., CHICAGO, September 28, 1885.

Hardware.—The warm weather of the past week had some influence on trade, slightly checking the rushing demand for Stove Fixtures and winter goods. The pleasant autumns of the West give excellent opportunity for outdoor improvements, and the partial cessation in the demand for one line is usually made up in another. The trade of the entire month has been very satisfactory in bulk. The quantity of goods sent from manufacturers and jobbers to retailers and consumers forms a remarkable contrast with that for the same time a year ago. The low ebb at which prices have been running prevents the appearance of a corresponding increase in the cash

value. Prices, however, have been fairly steady, and a small margin of profit has been made on large lines. Then, too, the over-anxious seller has withdrawn and less cutting is done by competitors, which, with the small advances that have been made, greatly improve the condition of trade over that of the preceding three years. The increased consumption has every appearance of permanence, and with it prices will gradually harden until a profitable business is again established in all lines of trade. Japanned and Tinned (XC finished) Harness Buckles have been advanced by manufacturers to 60¢ off. This seems to be a spontaneous result of the improved condition of the Saddlery Hardware market. It is said that no united action was taken, and that all the houses fell in with the movement of one or two who took the lead. No other changes were announced for the week, except on Nails, which are given below.

Barb Wire.—The market for Licensed Wire continues active and firm. Jobbers are having more than their usual trade for this season of the year from small-lot buyers, while manufacturers claim that their demand from heavy consumers is much in excess of what it has been in other years. They claim that, since the advance in price on Plain Wire, orders for future delivery have greatly increased, and that they could, if so disposed, close contracts sufficient to keep their mills running to the 1st of May next. In view of the situation they decline to accept orders for anything except for immediate delivery with accompanying specifications. They say that it is possible they will not get higher figures than the present market value, but are willing to take the chances of a decline rather than to fill their factories with the orders now before them. Jobbers continue to quote \$3.50 for Painted, and \$4.50 for Galvanized, from store. It is believed that these prices are closely adhered to by the entire trade.

Nails.—The advance in price from Eastern mills, delivered here, and the continued demand for sizes which are scarce, has caused another advance in the price of Nails in this market. At a meeting of the local merchants on Friday last Iron Nails were advanced to \$2.50 3/4 keg, and Steel Nails to \$2.65, as the bottom price from store. Some of the houses were in favor of advancing the price of Iron Nails to \$2.60 and Steel Nails to \$2.75, and directed their men on the road to sell at these figures. It is not supposed that many sales will be made at 10¢ 3/4 keg above the price of their competitors, but the fact that they have not got the stock and cannot get it with any certainty makes it of no importance what figures they ask. It may be said that the supply of Iron Nails is a general way is a trifle better than several weeks ago. Jobbers now and then pick up a few lots which are made by the mills who are educating their feeders, and seem to be wise enough to cut only the leading sizes. In the stock of Steel Nails there is no change in the situation. What few Nails are being cut are not worth mentioning when compared with the demand, which leaves the market so bare that buyers can seldom obtain a full order.

American Pig Iron.—The market during the week has been a little more active. Quite a number of orders ranging from 50 to 200 tons were placed, but the aggregate does not foot up nearly the amount of Iron that changed hands the week previous. With the exception of several buyers of lots ranging from 500 to 1000 tons, there are no large contracts in sight. The majority of those who have closed contracts for large blocks of Iron had previously taken orders which would absorb the Iron they bought. Those who have yet to buy are waiting the results of the bids they have made on finished work. The advance of \$3 a ton on Old Rails is turning the attention of Bar-Iron makers toward obtaining cheap Pig Iron. It is possible that the scarcity of Old Rail Iron may open up a field for Pig Iron that this market has not supplied for several years. Furnacemen are becoming more and more sanguine on the subject of prices, and nearly every week some new concern is added to the list who are talking higher figures. While this adds considerably to the strength and tone of the market, we cannot learn that a single sale has been made at prices above those which have been quoted during the last 30 days. Some two or three Charcoal furnaces could be named who refuse to sell Lake Superior Charcoal Iron at less than \$19 @ \$19.50 cash, though we give it as a market quotation on carload lots, four months. Lake Superior Coke is unchanged at \$18 @ \$18.50; Cinder Mixed at \$17, and Ohio Standard Blackband at \$18.50. In Ohio Irons there appears to be a better appreciation that the Iron is scarce. A sales agent in this city for several of the furnaces says that he has difficulty in obtaining Iron to meet his wants at these figures. Southern Irons, it is claimed, are firmer, and all the cheap Irons that were on the market some time ago are said to have been taken up. No. 1 brand is quoted at \$17.50, four months; No. 2, \$16.50, with one lot having been sold at figures reported to be \$16.25 cash; No. 2 1/2, \$15.75; No. 3, \$14.50 @ \$15; and Mill Iron, \$13.50. It is stated that these prices have been refused for several of the grades during the week on lots ranging from 50 to 100 tons by some of the furnaces, while there are others who did not hesitate to take all they could get and are looking for more at the same price.

Structural Iron.—Sellers report quite a busy week in Architectural Iron in small lots. Nothing of importance in the way of sales has developed either in bridge or building material beyond what had been previously noted, so far as we can learn. None of the specifications that are cut have been placed, and some anxiety is felt by those who are expecting to get the work. We quote Bridge Plates, \$2.20; Angles, \$2.10; Tees, \$2.25 @ \$2.50; Beams and Channels, combination price, 3¢.

Merchant Steel.—The market for this class of material is the most unsatisfactory in every respect in the Iron trade. The persistence with which buyers stick to the small lot system is annoying both to the dealer and manufacturer, and they complain that they cannot get a basis on which to establish a regular price. From their reports this is the only remaining branch of trade where the buyer names his figures and the seller either accepts or loses the order. The numerous lines of consumption where Steel can be supplemented with Iron or Iron with Steel make it unimportant to the buyer whether he takes the article at the price named or not, and the Steel merchant, rather than lose the sale or the opportunity to make a new customer, lets the Steel go at whatever figures are named. Tool Steels are manufactured and sold in all grades, and many of the low prices that are named are denied by other manufacturers, but they nevertheless exist, and on a line of material that frequently supplants grades of a more reputable quality. A nominal quotation for the best makes continues to be 8¢ @ 9¢, but the irregularity in trade makes this price subject to specifications, the buyer and quantity of other material which is included in the order. On Open-Hearth and Bessemer we quote 2 3/4¢ @ 3¢, 4 1/4¢ @ 5¢ for Crucible, and 5 1/4¢ @ 6¢ for Plow Steels, which we believe to be a fair price for the best grades in their respective classes.

Plate and Tank Irons.—There has been a very fair trade in this class of Iron during the week, but nothing of unusual importance has occurred. There being no change, we continue the quotations from store on Tank Iron at 2.20¢ @ 2.30¢; Shell, 3 1/4¢; Flange, 3 1/4¢ @ 4¢; Fire-Box, 4.50¢ @ 5 1/4¢. The wide ranges in some cases is accounted for by the great difference in quality.

Steel Rails.—While there is no improvement in the demand for large quantities, there has been a fair trade during the week for small orders. Some 400 tons for immediate delivery were sold at \$33, and 7000 tons refused at \$32.90. On one lot of 20 tons Ordinary Rails, \$35 was asked. For delivery in 1886 contracts for large blocks could be made at about \$32 @ 32.50 at mill, thus giving a substantial evidence that there is an advance of from \$3 to \$3.50 per ton on immediate delivery and \$2 a ton on long-time deliveries in this market. A contract for 10,000 tons was closed to-day at \$32 per ton, presumed to be for delivery after January next. Makers are feeling decidedly better over the situation, and are looking forward to a much more profitable business.

Bar Iron.—There has been considerable improvement during the month. Dealers in Common Iron are complaining that they cannot place their orders at as low figures as they would like, the embarrassing point with them being that it is difficult to obtain an advance from consumers. They ask higher prices, and, in comparison with the advance made by manufacturers, should get them. But when this advance is compared with the price on New Puddled Iron they are brought so close together that the consumer prefers the latter at a tenth above the figures which he is asked to pay for Old Rail Bars. From store jobbers are quoting 1.80¢ rates on New Puddled Iron, and 1.65¢ @ 1.7¢ from mill, according to specifications. Common Iron is quoted 1.70¢ rates from store and 1.55¢ @ 1.60¢ from mill. It is said that very few of the mills are willing to sell at the lower figures unless the order contains a large proportion of extras. In both classes quite an increased trade is reported. One house who handle a varied assortment of material say that their trade is at least one-third larger than it has been for the same period for several years.

Old Rails.—The great increase in the demand for Old Rails in the past two weeks has sent asking prices considerably above the market value. There are yet a good many Rails lying around, but the holders have apparently withdrawn them from the market, as they ask anywhere from \$18.50 to \$20 per ton. Mills are quoting \$18, Chicago delivery, and thus far have been able to obtain most of their stock at this figure. One lot of 500 tons, however, was sold at \$18.50, and on another of 100 tons \$17.75, cash, was refused.

Black Sheets.—There continues to be a fair demand for Black Sheets. We hear less complaint regarding stock, and from all appearances jobbers' quotations continue firm from store at \$13 for No. 24, \$13.20 for Nos. 25 and 26, and \$13.30 for No. 27, while mills report that they are still full of work. They are nevertheless giving buyers more attention and are not quite so stiff in the prices they are asking. From what can be earned it is evident that there is sufficient now in the market to carry them over for the month of October, and for November and December delivery mills are as likely to be looking for orders as the orders are for them.

Galvanized Iron.—In the small-lot business the market is quite active. All makers

in this vicinity are reported full of work and jobbers are having a very good trade in small lots. The advance price inaugurated in the East does not seem to have affected this market. We cannot learn that mills are getting better prices, and jobbers have not changed their quotations from 60¢ off on Juniata and 60 and 10¢ off on Charcoal.

Car Wheels.—It cannot be said that the quantity of Car Wheels is small, but the buyer frequently has some difficulty in obtaining what he wants at the figures prevailing. Whole Wheels are quoted at \$14 @ \$14.50, and Broken at 50¢ advance of this price. Those who have the stock decline to sell, because they believe that higher figures will prevail if present prospects are not deceiving. Two lots were sold at our quotations, and one lot was refused at \$15, cash.

Scrap Iron.—There was a fair demand for all grades of Scrap, and prices have ruled firm at \$14.50 for No. 1 Mill and \$9.50 for No. 2. On Selected Forge dealers are asking \$16.50 @ \$17, f.o.b., though they are looking for sufficient increase in trade to force the price higher. Dealers' purchasing prices vary with the supply and demand, but have not changed from last quotations.

Pig Lead.—The market has been quiet during the past week. Sales of some 600 tons are reported at \$4.15, which appears to be a settled figure for both Corrosive and Corroding qualities for October delivery. Lead Pipe is quoted at 6 1/4¢, and Sheet Lead at 6 3/4¢, with a discount of 10¢ on both.

Chattanooga.

Office of The Iron Age, Carter and Ninth Sts., Chattanooga, September 28, 1885.

A general review of the business centers through the South indicates a steady increase in volume and generally satisfactory conditions. Just at the present time the farmers are energetically engaged in gathering their crops, which gives them but little time to pay attention to anything else; consequently trade has fallen off to some extent. There will be considerable difficulty experienced by the cotton raisers in getting sufficient help to gather the crop. This has generally been the case where large crops have been raised, but this year it will be more so than ever; \$2.50 to \$4 per day is not an unusual figure for working hands to realize under such circumstances. Hands who are willing to work will have no excuse for idleness during the balance of the year, especially through what is known as the cotton belt. During the coming month most of the railroads will have more freight offered than they can transport, and the lines are calling home every stray car and putting those they have in first-class condition. There is no cessation in inquiries for our manufactured articles, and many of our factories are making arrangements for enlarging their works in anticipation of increased business. Some of the Eastern papers and correspondents are again stating that an advance has been made on Pig-Iron rates from Birmingham and Chattanooga to Eastern points. Such is not the case.

Pig Iron.—There has been no particular change to note in this article since our last report. The attitude of producer and buyer remains at about the same status as before mentioned. There would be no difficulty in placing the entire capacity of all the Southern furnaces for the next six months at the advance that has been reported, and, while there is an uncertain feeling among furnace proprietors about a still further advance, they are yet cautious in making contracts for large amounts that would commit them for several months to come. Of course, with a capacity of, say, 1500 tons per day, sales of round lots are constantly made, and a transaction involving 5000 to 10,000 tons is not unfrequent; but they are generally made for delivery in the immediate future, and do not extend very far ahead. No. 2 Stack of the South Pittsburgh furnaces has gone out of blast for the purpose of being thoroughly overhauled and relined, and it is estimated that seven to eight weeks will be the time that she will be out.

Hardware.—There is much difficulty being experienced by the merchants in getting a supply of Nails, and the works through the Southern district are having more orders than they can fill. Building is going on with the same activity as ever, and a slight advance has taken place in all building material. Bar Iron still continues active at the advance; the mills are having all they can do, and the works here are enlarging their capacity and will then start double turn.

Miscellaneous.—The demand for Drain Tile is very heavy, and the works are running full. Contracts for barrel and hoghead shooks have been made in the West Indies which will occupy the capacity of the works for several weeks.

Birmingham.

BIRMINGHAM, Ala., September 23, 1885.

The past was an altogether uneventful week here. Business continues to improve steadily, and a hopeful feeling prevails in all branches. Secretary Manning's inquiries about Iron-making are a fertile topic of conversation among the Iron men here just now. One furnace, in answer to the Secretary's confidential letter, has furnished him items taken from its books and practically covering the whole ground of the cost of its product. Newspaper men will look out for these figures with no little curiosity, until they learn that the information was given on the distinct stipulation that it should not be published. The fact that the Linn Iron Works have of late been compelled almost to put aside important work they were doing for their owners, the Pratt Coal and Iron Company, in order to keep up with their custom work, is hardly more than a fair illustration of the state of business at the foundries and machine shops here.

Pig Iron.—Certain phases of the improvement in the Pig-Iron business, which could not be shown by any comparison of market figures, were more conspicuous last week than ever—for the most part illustrating the fact that there is more and more disposition on the part of buyers, and less and less solicitude on the part of sellers, to close contracts for Iron. For instance, there is notably less necessity for and less chance of the concessions which during the dull times manufacturers would make in the matter of the grading of the Irons. The volume of business continues to be very satisfactory. This is true of shipments to the East conspicuously, and in spite of a slight disadvantage in freight rates. In anticipation of the demands of the cotton crop upon the comparatively small tonnage capacity of the marine plying between Savannah and these points, New York, Philadelphia and Boston are buying very satisfactorily. Some of the furnace report prices stationary, while others say their sales last week would average probably 25¢ better than those of the week before. The business in the aggregate, though, right here in and around Birmingham, is more satisfactory than heretofore, for the reason that some of the furnaces are making better Iron than they ever made before.

Roller Iron.—The stress to which the rolling-mill capacity hereabouts is subjected increases, if anything. It is now beginning to affect the dealings of the mills with comparatively small merchant customers here at home.

Nails.—The difficulty in supplying the demand for Nails grows more and more serious, and keeps the dealers here constantly writing letters to every place in the country that makes Nails or even jobs them largely. As a rule, however, prices have not been advanced. The Alabama mills still sell by a \$2.15 card, f.o.b., and the wholesale dealers here at \$2.40 for Iron and \$2.75 for Steel Nails, with a tendency—due, of course, to the stoppage of the Steel mills—toward a widening of the 35¢ difference.

Coal and Coke.—The growing demand has not yet made prices satisfactory to Coal men, while Coke burners are keenly conscious that the improvement in the Iron trade, which is, of course, their main reliance, has a good way to go yet before it can bring them any better pay under their sliding scale.

Cincinnati.

SEPTEMBER 28, 1885.

Pig Iron.—The market as reported last week remains unchanged as to volume or price. The increased demand and advance of 25¢ @ 50¢ per ton in prices reported for Southern makes is not verified by the offers made to consumers in this region through the past week. The monthly report of the Western Pig Iron Association last issued shows reliably the actual situation of the present stocks as compared with the month previous. That the production is fully equal to the consumption there can be no doubt. It is thought that the outlook upon the trade generally is decidedly encouraging for a more active trade, if not for advanced prices. Quotations of sales in the past week:

CHARCOAL FOUNDRY.	
Hanging Rock, No. 1, Best, 4 mos.	\$20.00 @ \$21.00
Hanging Rock, No. 1, Good, 4 mos.	19.00 @ 20.00
Southern No. 1, cash.	17.50 @ 18.00
Southern No. 2, cash.	16.00 @ 17.50
COKE FOUNDRY.	
Ohio and West Pennsylvania, No. 1, 4 mos.	16.00 @ 18.50
Ohio and West Pennsylvania, No. 2, 4 mos.	15.00 @ 17.00
Southern No. 1, cash.	16.00 @ 17.00
Southern No. 2, cash.	15.00 @ 16.00
Southern No. 3, cash.	13.00 @ 14.50
SILVER-GRAY SOFTENERS.	
Hanging Rock (Jackson County), No. 1, 4 mos.	16.50 @ 17.00
Hanging Rock (Jackson County), No. 2, 4 mos.	15.50 @ 15.75
Hanging Rock (Jackson County), No. 3, 4 mos.	15.00 @ 15.25
Other makes.	15.00 @ 14.50
CAR WHEEL.	
Hanging Rock, Cold-Blast, 4 mos.	23.00 @ 25.50
Hanging Rock, Warm-Blast, 4 mos.	19.00 @ 20.50
Southern Warm-Blast, cash.	17.00 @ 18.00
Southern Standard, Warm-Blast, cash.	23.00 @ 24.00
Southern Standard, Cold Blast, cash.	24.00 @ 25.00
FORGE.	
Various grades, cash.	12.00 @ 15.00
SCRAP.	
Car Wheels.	13.50 @ 14.00
Rails.	17.50 @ 18.00
Wrought, per 100 tons.	.65 @ .80
Cast, per 100 tons.	.40 @ .50

The above quotations of Pig Iron are f.o.b. here. Orders filled from furnaces will be at prices less the freight to Cincinnati. A reduction of 50¢ per ton will be made from time prices for cash.

St. Louis.

ST. LOUIS, September 28, 1885.

Events during the past week have not changed the favorable conditions previously noted. The Exposition is enlivening business with retailers, and jobbers note continued steady demand; but with the Malleable-Iron and other foundries there is room for improvement. The most notable occurrence in manufacturing circles was the sale of the St. Louis Cotton Factory on the 22d inst., under mortgage securing bonds. The property is

valued at \$500,000. The purchaser was Mr. James E. Yeatman, who is reported as acting in trust for the bondholders. It is probable that efforts now being made will result in an arrangement by which the factory will be put in operation during the fall. Clearing House reports show an increase of 5% over that of the previous week, and banks are doing a thriving business.

Hardware.—Jobbers are doing a brisk business, and changes in prices are mostly in consequence of announced changes by factories. The change of season is bringing about the usual demand for House-Furnishing and Sporting Goods.

Merchant Iron.—Stores are doing a satisfactory business, with both demand and prices steady. Judging by the quantity ordered and frequency of orders for Bar Iron, there is no apprehension of higher prices in the minds of consumers, but the comparatively light stocks of Sheet Iron, both Black and Galvanized, have a tendency to confirm prediction of higher prices on these kinds.

Nails.—Unfortunately, there is no change to report with regard to the market or the mills, although the receipts have been more satisfactory than during August. Iron Nails are nominally \$2.50 at stores and business almost entirely retail.

Wire.—Market Wire is a shade higher in a retail way. The announcement of an advance by a majority of the mills, made on the 24th inst., more than counteracted any anticipation of permanent prices on Fence Wire as a result of resumption of work at the Cleveland Rolling Mills. Barbed-Wire manufacturers are inclined to doubt adherence to prices announced at meetings, especially those who are not among the fortunate that have placed orders for round lots at low prices.

Lead.—Receipts and shipments during the week were much larger than during a similar time in 1884, but a slight decline occurred on the 25th inst., and about 600 tons of Refined were sold at \$12 1/2. A decline on the Common or Hard, in keeping with the change on Refined, is expected during next week, although the Hard has been firm at \$4.10.

Barbed Wire.—As the advances in prices of Plain Wire have been the most forcible cause for higher prices on the Barbed Wire, it is probable that recent advances from Wire mills will soon cause a change in this market. So far, however, there has been no perceptible advance over last week, although some of the factories that are well supplied with orders are asking more. There have been further additions of Scott machines by unlicensed factories, and the change to Flat Barbs from Round appears to be connected with a possible verdict in suits docketed for the present term of the United States Court of this district.

Spelter.—This metal is now exciting more interest in this market than it has during the past four months, and the sudden advance made lately seems to be maintained, aided by present favorable rates of freight eastward and the uncertainty of their continuance.

W. H. SHIELDS, 305 Olive street, St. Louis, reports as follows, under date of September 28, 1885: The condition of the market has not changed since last report. Buyers and sellers have come to the conclusion that there will be no boom. There is no quotable advance here in standard brands. The demand for Old Rails, both Iron and Steel, is good:

CHARCOAL FOUNDRY.	
Missouri.	\$15.00 @ \$16.00
Southern.	16.00 @ 17.50
COAL AND COKE FOUNDRY.	
Missouri.	14.00 @ 16.00
Southern.	15.00 @ 17.00
American Scotch.	16.00 @ 19.00
MILL IRON.	
Missouri.	14.00 @ 14.50
Southern.	13.50 @ 14.00
CAR-WHEEL AND MALLEABLE.	
Southern.	20.00 @ 24.00
Lake Superior.	20.00 @ 22.00
SCRAP, ETC.	
Old Car Wheels.	14.00 @ 14.50
Old Rails, Iron.	16.75 @ 17.00
Old Rails, Steel.	15.00 @ 15.25
Wrought Scrap, No. 1.	.55 @ .65
Cast Scrap, No. 1.	.45 @ .55
Connellsville Coke (East St. Louis).	5.30 @ .

Louisville.

W. B. BELKNAP & Co., Louisville, under date of September 28, 1885, report as follows: The market for most Hardware is fairly active; minor advances may be noted at various points along the line. At the same time there is not snap enough to it to relieve it of commonplaceness, and such advances as are established are accepted under a good deal of protest and accompanied by more or less effort to reduce to "same as last." While thus the burden of business is in nowise rendered lighter, still it is not unpleasant to reflect that the goods one looks at on his shelves are worth as much, if not more, than he paid for them 30 or 60 days ago, a rather novel sensation after the experience of the past two years, and indications are toward a better state of affairs generally. Among the most hopeful signs is the announced advance in west-bound freight rates set for October 5. The new tariff cards are taken, however, with a touch of incredulity. It has been so long since the railroads have even endeavored to get better rates, much less to maintain them, that it is only natural that some doubt should hamper the present effort. Bar Iron.—The Southern mills especially are full of orders, as their production is limited and not too much for tributary markets. The increase in production among the Northern mills incident to starting a good many idle concerns has kept pace with the increased demand, and so far prices have been affected but little. Hoops and Bands.—These have recovered somewhat from the extreme depth into

which they sunk in the early summer, when they were cheaper than ever before, according to the records. An advance of about \$2 per ton is asked, and if business keeps up or improves will probably be paid without much dispute. Sheets.—The extreme anxiety of a few weeks ago has vanished, as the mills of the largest capacity are at work, but there is still a short supply of sheets of almost all gauges, and full prices are easily obtained.

Nails.—The greatest interest of the trade remains centered on Nails. Prices have advanced day by day, and were it not for the realization upon old stocks held for speculation—the purchase of some of which date back to last December—the market here would be in a worse condition than it is. Large orders are not sought for, and the best any one attempts to do is to make partial shipments. Lending sizes, such as 8, 10 and 20, are especially scarce. Southern mills are running full and are crowded with work; others whose manufacture is discriminated against when Wheeling is in the field are reaping full benefit, as buyers are less critical, and now that freight rates from the East are to be advanced Eastern mills will not find it so easy to get into the Western market. A great difference of opinion exists as to the probable cessation of the strike. The Nail manufacturers seem determined, and, as one of them wrote to us a day or two since, "when he starts his mill it will be on his own terms, if it takes a year to gain that point." On the other hand, the compromise of the glass works at Bellaire, and the yielding of the Cleveland Rolling Mill to the demands of the men, naturally encourage the nailers on their part. At any rate, the situation is very interesting as it is, and the development of each day are eagerly awaited. Wire.—A genuine advance at last seems to be established on Wire. The mills are asking at least 10¢ more for Plain and about 5¢ on Barbed Wire. It is not easy yet to obtain this advance in full, as a large amount is made up and offering freely in the market. Still, when the St. Louis moonshiners put on a bold front to buyers, as well as to the courts, we are inclined to believe that something has actually happened. Ammunition.—Continues to flow into this market via St. Louis, a verification of the old proverb that "the longest way around is often the shortest way there," and leads us to the conclusion that, if the "A" list is the lowest pronounceable one, there is, nevertheless, a silent letter which precedes it in the alphabet of the manufacturers. Local business is good, and the railroads centering here are getting their full share—in fact, some of them are much overcrowded.

GEORGE H. HULL & Co., of Louisville, report to us as follows, under date of September 29, 1885: The market for Pig Iron continues fully as active as for the last two weeks, and considerable sales, both for present and future delivery, are being booked at current prices. Some furnaces are holding their Irons at full figures and realizing, notably the furnaces that have the best reputation for their Iron. Other furnaces, however, force some sales by concessions. These are notably Irons which have not given best satisfaction during the last six months or a year. We quote for cash in round lots as below:

PIG IRON.	
Southern Coke, No. 1 Foundry.	\$16.00 @ \$17.00
" " No. 2 "	15.00 @ 16.00
" " No. 2 1/2 "	14.00 @ 14.50
Hanging Rock Coke, No. 1 Foundry.	15.75 @ 16.25
Hanging Rock Charcoal, No. 1 Foundry.	19.00 @ 20.00
Southern Charcoal, No. 1 Foundry.	17.00 @ 18.00
Silver Gray, different grades.	14.00 @ 15.50
Southern Coke, No. 1 Mill, Neutral.	13.50 @ 13.75
" " No. 2 "	12.50 @ 13.00
" " No. 3 " Cold Short	12.50 @ 13.00
Southern Charcoal, No. 1 Mill.	16.00 @ 17.00
White and Mottled, different grades.	11.00 @ 12.25
Southern Car Wheel, standard brands.	23.00 @ 24.00
Southern Car Wheel, other brands.	18.00 @ 20.00
Hanging Rock, Cold-blast.	23.00 @ 24.00
" " Warm-blast.	18.00 @ 20.00
Old Material.	
The market for Scrap Iron shows a little more life, but quotations continue the same. We quote for cash as below:	
Rails, per ton.	\$16.00 @ \$16.50
Wheels, per ton.	13.00 @ 14.00
No. 1 Wrought, per 100.	.65 @ .70
Country Wrought, per 100.	.50 @ .60
No. 1 Cast, per 100.	15.00 @ 17.00
Boilers, cut, per 100.	.60 @ .65
Boilers, uncut, per 100.	.40 @ .45
Axles, per 100.	.90 @ .95
Flues, Tanks and Sheets, per 100.	.30 @ .35
Burned Scrap, per 100.	.30 @ .35

Detroit.

CHARLES HIMROD & Co., dealers in Pig Iron, Detroit, Mich., report, under date of September 28, 1885, as follows: Considerable trade has taken place in the State during the past week; the smaller foundries seem to have plenty to do, and many inquiries have been made. In the East Charcoal Iron has been in considerable demand at advanced prices. We know of one sale having been made of 500 tons at 50¢ advance over an offer refused by the buyer a month since. These things would seem to indicate that the low sellers are either entirely sold up or are coming to their senses. The sale of 7000 tons of Charcoal Iron to the Oliver Company, at South Bend, has forced the greatest bear furnace in the trade out of the market for the present. It has been said that this sale was made, deliveries extending two years, at present market rates. The stovemen are very busy and behind on their orders. The accumulated stocks of last year are being worked off to an advantage. Some of these men have made season's purchase of Iron, deliveries extending into the coming year, while others are buying only for their present needs, so as to get their stocks down to a minimum at the time of taking inventory, January next. There is no demand for Old Wheels, but a strong one for Old Rails by the mills. For round lots on four months' time we present the following:

Lake Superior Charcoal, Nos. 1, 2 and 3.	\$19.75 @ \$20.25
Lake Superior Charcoal, Nos. 4, 5 and 6.	20.00 @ 21.00
Lake Superior Coke, All Ore.	18.50 @ 19.25
Lake Superior Coke, Cinder Mixed.	17.00 @ 17.50
Standard Ohio Blackband.	18.75 @ 19.25
Southern No. 2.	16.50 @ 17.25
Southern Silvery, Open.	16.00 @ 16.50
Southern Silvery, Close.	15.50 @ 16.00
Jackson Co. (Ohio) Silvery.	18.00 @ 18.50
No. 1 Southern Mill.	13.00 @ 14.00
Old American Rails, Iron.	18.50 @ 19.50
Old Wheels.	15.00 @ 16.00

Trade Report.

General Hardware.

There is no change in the general aspect of the market since our last writing. A good business is doing in a regular and steady way. A hopeful feeling prevails that the improvement which characterizes the situation will continue. Prices still show a tendency to a greater firmness, and some lines of goods are slightly higher. There is also more delay in getting orders for certain goods filled, stocks being in many cases small, and in some already broken. Collections are reported good, and the financial condition is generally regarded as satisfactory.

NAILS.

At a meeting of the Eastern manufacturers last Thursday the card was advanced to \$2 30, and that figure has since generally prevailed for lots from store. The prospect of an early advance of west-bound freights has caused a spurt in the demand from the West, and has aided the hardening of prices. It is likely, however, that the calls from that direction will not be so heavy immediately after the consummation of the fact which led to it. The local demand continues merely from hand to mouth, but those who are forced to enter the market to replenish supplies must pay higher figures than a week since.

The situation in the West will be more clearly understood from the perusal of the following extracts from letters from manufacturers:

In the Pittsburgh district, so far as our advices extend, there does not appear to be a single mill running.

One of the manufacturers there writes: "The new scale offered is a fair one, and none of the manufacturers now idle will resume until it is accepted, if it should take all winter to get down to it."

The greatest measure of success in running machines without the aid of nailers has been in the Wheeling district, where it is estimated there are now about 300 machines running at the manufacturers' scale, and reports agree in stating that the number is constantly increasing. One of the leading manufacturers in the Wheeling district writes:

The product per machine with many of the workmen is fully up to the average, and the good quality exceeds the expectations of the most sanguine manufacturers. There can be but one view of the situation. It is a business necessity for the manufacturers of the Western Nail Association that they succeed in this struggle if they desire to maintain their place in the markets of this country. This can do by paying their labor about the same wages as are paid by competing manufacturers of other sections. As it is a necessity to have wages reduced, the mills will be operated at prices named in the manufacturers' scale or not operated at all. Manufacturers were never better united or more determined than in this struggle for business existence, and the idea that we will not succeed has never been for a moment entertained. Should the number of machines increase in the next two weeks as they have in the past two, the writer is of the opinion that the Western Nail Association will be able to fill all the orders required by the Western markets, and the old nailer can spend the balance of his existence explaining how he did not win the fight."

Another manufacturer from the same district writes in very much the same strain, and letters from Ohio and Pennsylvania mills breathe the same firm determination. From inquiries we have made the quality of the product is such that manufacturers need not be ashamed to put their brands on it, and the quantity produced per machine is affected mainly by the time taken by the new nailers in grinding their own machines.

A number of mills have been running from the start, among them the Cobb's Iron and Nail Company, of Aurora, Ind., who inform us that they have over 10,000 kegs, well assorted, in stock, and are running steadily full with non-union men.

BARB WIRE.

The market is quiet, the leading event of interest being the sale at auction of about 150,000 pounds of Galvanized Barb Wire at prices ranging downward from 4 to 2½ cents. The bulk of the wire, about 60,000 pounds, was sold at 3 cents and the sales at 2½ cents are said to be conditional on acceptance. The names of the makers are withheld, a fact which is not surprising when the quality of the Barb Wire is considered. Taking into account the apparent low quality and the fact that the troublesome question of Licensed and Unlicensed Wire seems to be cropping up in this market, very little significance will be attached to the sale. We quote Four-Point Galvanized Licensed Barb Wire, in carload lots, 4.35 to 4.45 cents, and small lots 4.55 to 4.70 cents.

SCYTHES.

The association prices on Scythes are represented in the circular of H. Knickerbaker, Balston Spa, N. Y., for whom John H. Graham & Co. are agents, 113 Chambers street, New York, which gives the net prices of Isaiah Blood's and Special Brand Scythes. The prices given are for purchases of less than 25 dozen Scythes during the season ending July 31, 1886:

Grass Scythes.

Clipper, full polished, boxed and sharp..... \$8.90
German, Cast or Silver Steel, either half-set or Waldron, in straw..... 8.35

Grass Scythes.	
Silver Clipper, boxed and sharp.....	7.00
Cutlass Steel, both webs polished, boxed and sharp.....	7.80
German Steel, beaded or half-set, Young America, or half-set Waldron.....	6.10
Cast Steel and German Steel, full set or Waldron. German Clipper, Western Dutchman and Rough and Ready, sharp and boxed.....	6.70
Bush, Bramble and Weed Scythes.....	7.00
Clover Scythes.....	7.00
Imperfect Grass and Bush.....	5.00
Imperfect Grain.....	6.70
Lawn Scythes, same price as corresponding finish. Terms—May 1 for all shipments between November 1 and March 1, or 2 per cent. cash 10 days from March 1. Sixty days on all other shipments, or 2 per cent. cash 10 days.	
Goods Delivered.—For prepayment a discount at the rate of 6 per cent. per annum will be allowed for unexpired time.	
Blood's Champion Grass Hooks, all numbers, per doz., net, July 1, 1886.....	\$2.00
Blood's Clipper Corn Knives, all Steel, per doz., net, January 1, 1887.....	1.80
Blood's Handled Bush Hooks, per doz., 3 mos. Blood's Two-Ringed Bush Hooks, per doz., three months.....	7.50

The following are the prices of the Auburn Mfg. Co., Auburn, N. Y., for whom Durrie & McCarty are agents, 97 Chambers street, on the goods covered by the agreement of the Scythe Manufacturers' Association:

Grain Scythes, Ground Sharp and Boxed.

No. 22, "Clipper Grain," Extra Full Polished Blade and Back, Green, Bronzed Set..... \$8.90

Grain Scythes, Packed in Straw.

No. 327, "Cast Steel," Full-Polished Blade and Top of Back, Red..... \$8.35

No. 328, "German Steel," Full-Polished Blade, Blue..... 8.35

No. 329, "Half Set," Cast Steel, Top of Back Polished, Painted Blade, Green..... 8.35

Grass Scythes.

No. 334, "Our Clipper," Full Polished Blade and Back, Bronzed Set, Red..... 7.00

Grass and Lawn Scythes, Packed in Straw.

No. 335, "The Racer," Top of Back Polished, Blade Bronzed, Bottom Red..... \$6.70

No. 336, "Ready for Grass," Top of Back Polished, Green..... 6.70

No. 337, "Honest Dutchman," Top of Back Polished, Blade Bronzed, Bottom Red..... 6.70

No. 338, "The Favorite," Top of Back Polished, Two Ribs, Green and Striped..... 6.70

No. 339, "Silver Steel," Half Set, Full-Polished Back, Red..... 6.70

No. 340, "Cast Steel," Full Set, Polished Blade and Top of Back, Red..... 6.70

No. 341, "German Steel," Half Set, Painted Green or Blue..... 6.70

No. 342, "Waldron Pattern," Cast Steel, Full Set, Blade and Top of Back Polished, Red..... 6.10

No. 343, "Waldron Pattern," German Steel, Painted Blade, Blue..... 6.10

No. 344, Half Set, Cast Steel Lawn, Green or Red..... 6.70

Bush or Bramble and Weed Scythes.—Strawed in Half-Dozen Packages.

No. 256, "B Pattern," Bush, Ribbed, Steel Back, Red or Blue..... \$6.70

No. 357, Railroad or Weed, Ribbed, Steel Back, Green..... 6.70

No. 358, New Orleans Bramble, Full Set, Oiled, Polished Web..... 6.70

SISE, GIBSON & CO.,

Birmingham, Conn., and 100 Chambers street, New York, are about to issue their price list of Ice and Roller Skates for the season of 1885-86. It represents their complete line, with latest additions, and it will be observed that prices have been revised since last season. The list, which we give below, is subject to a discount of 10 per cent. on Ladies' Skates and of 30 per cent. on Gentlemen's:

Gibson's "B X."

Club pattern; complete with Toe Strap and Heel Plates; Japan finish.

Sizes, 8 to 11 inches..... \$0.35

Gibson's "New York Club" "D X."

New and improved design; Clamps operated by Double Right and Left Screw.

Sizes, 8 to 11 inches, with Japan finish..... \$0.75

Gibson's "All Clamp" "C X." Blue Steel Tops.

Sizes, 8 to 11 inches, with Japaned Blade..... \$1.00

Gibson's "New York Club" "E X."

Sizes, 8 to 11½ inches, Blue..... \$1.50

Nickel..... \$2.50

Gibson's Original "New York Club" "H X."

Sizes, 8 to 11½ inches, Blue..... \$2.50

Nickel..... \$3.50

Nickel and Polished..... \$4.50

Gibson's "All Clamp" "F X."

Sizes, 8 to 11½ inches, Blue..... \$2.50

Nickel..... \$3.50

Gibson's "All Clamp" "G X."

Sizes, 8 to 11½ inches, Blue..... \$3.50

Nickel..... \$4.50

Nickel and Polished..... \$5.50

Gibson's "Self-Adjuster," No. 150 With Steel Blades.

Sizes, 8 to 11½ inches, Blue..... \$8.00

Nickel..... 4.00

Gibson's "Self-Adjuster," No. 150 With Steel Welded Blades.

Sizes, 8 to 11½ inches, Blue..... \$4.00

Nickel..... 5.00

Nickel and Polished..... 6.00

Gibson's "New Derby" Lever, No. 1, A. Finest Tempered Welded Blade.

Sizes, 8 to 11½ inches, Blue..... \$4.50

Nickel..... 5.50

Nickel and Polished..... 6.50

Gibson's "New Derby" Lever, No. 2, All Steel.

Sizes, 8 to 11½ inches, Blue..... \$3.50

Nickel..... 4.50

Shirley's Patent Skates.

With Adjustable Toe Fastenings, and Hawkins' Patent Heel Fastenings.

Sizes, 7 to 12 inches..... \$3.50

Gibson's Ladies' Wood-Top Skate, "X."

Black Straps, Patent Buckles, Brass Mountings, Best Beechwood Top.

Sizes, 8 to 10 inches..... \$1.00

Gibson's Ladies' Wood-Top Skate, "W X."

Best Beechwood Top; finest quality of Russet Leather Mountings, with Patent Buckles; Polished Nickel Heel Band, Polished Blade.

Sizes, 8 to 10 inches..... \$1.25

Gibson's Ladies' Skate, "L D X."

Blue Steel Tops, Blades Japaned, Heel Bands of best Russet Leather, Nickel Mounted; Patent Buckles, Clamps operated by Double Right and Left Screw.

Sizes, 8 to 10½ inches. With Jap'd Blade..... \$2.00

Gibson's Ladies' Skate, "L E X."

Finely finished, with Blue, Nickel, and Polished and Nickel Tops; best Russet Leather Heel Bands, Nickel Mounted, Blade finely polished.

Sizes, 8 to 10½ inches. Blue..... \$2.50

Nickel..... 3.50

Polished and Nickel..... 4.50

The "Derby" Roller Skate.

No. 20, All Clamp.

Blue, per pair..... \$4.00

Extra Tin-Plated, per pair..... 4.50

Nickel and Polished, per pair..... 6.00

No. 25, All Clamp and Heel Thumb-Screw.

Blue, per pair..... \$4.50

Extra Tin-Plated, per pair..... 5.00

Nickel and Polished, per pair..... 6.50

Heel Thumb-Screw works both Toe and Heel Clamps, saving use of Key.

No. 30, Half-Clamp and Extra Leather Heel Strap.

Blue, per pair..... \$4.00

Extra Tin-Plated, per pair..... 4.50

Nickel and Polished, per pair..... 6.00

No. 35, Half-Clamp, Leather Heel Strap and Thumb-Screw..... \$4.50
Blue, per pair..... 5.00
Extra Tin-Plated, per pair..... 5.50
Nickle and Polished..... 6.00
Heel Thumb-Screw works Toe Clamps, saving use of Key.

No. 40, Half-Clamp Narrow Heel Strap.

Blue, per pair..... \$3.75

Extra Tin-Plated..... 4.25

No. 45, Half-Clamp Narrow Heel Strap and Thumb-Screw.

Blue, per pair..... \$4.25

Extra Tin-Plated, per pair..... 4.75

Sise, Gibson & Co., 100 Chambers street, New York, sole agents for the

BARNES MFG. CO.,

New Haven, Conn., issue, October 1, the following sheet of discounts for sheet list of "Horse Hoof" Padlocks and Barnes Mfg. Co.'s catalogue of 1884:

"Horse Shoe" Padlocks, No. 610..... 40

"Horse Hoof" Padlocks, Nos. 620 and 622..... 50

Padlocks, Nos. 670 and 672..... 40

Drawer Locks, Nos. 440 to 462..... 40

Drawer Locks, Nos. 472 to 474..... 40

Night Latches, Nos. 90 to 95..... 50

Night Latches, Nos. 104 to 120..... 40

Store Door Locks, Nos. 250 to 256..... 50

Blank Keys..... 50

Fitted Keys..... 50

They also call especial attention to their line of Drawer Locks.

BRASS GOODS.

The market on Brass Goods for plumbers, steam and gas fitters has for some time been in an irregular and demoralized condition and prices have ruled low. We are glad to be able to report an improved tone and a general strengthening of price, with an advance of about 10 per cent. which is being made by the leading houses. There has been no formal agreement among the different manufacturers to secure this end, but conferring together the necessity for such an advance is recognized, and the present condition of business, many of the houses being well supplied with orders, is regarded as favorable to such movement. The result thus far has been the withdrawal of previous quotations, an advance in quotations by some of the leading houses, and an expression of willingness on the part of other manufacturers to co-operate in this movement and maintain the advanced prices. It is also hoped that it may be feasible to make a further advance before long, the action above referred to being regarded as preliminary. There is no doubt that the market is stronger than it has been, and that prices for this line of goods are somewhat higher. The following houses, among whom are the leading manufacturers, are giving their co-operation, and are reported as having either advanced their quotations or signified their readiness to do so:

THE UNITED BRASS COMPANY, New York.

EATON, COLE & BURNHAM MFG. CO., N. Y.

PECK BROS. & CO., New York.

MENAB & HARLIN MFG. CO., New York.

HENRY McSHANE & CO., Baltimore, Md.

WILLIAM POWELL & CO., Cincinnati, Ohio.

THE BELKNAP MFG. CO., Bridgeport, Conn.

H. BELFIELD & CO., Philadelphia, Pa.

WALWORTH MFG. CO., Boston, Mass.

JARECKI MFG. CO., Erie, Pa.

WRIGHT & COLWELL, Baltimore, Md.

CRANE BROS. MFG. CO., Chicago, Ill.

BUCKEYE IRON AND BRASS WORKS, Dayton.

CINCINNATI BRASS WORKS, Cincinnati.

ITEMS.

The last catalogue of the Millers Falls Company, Millers Falls, Mass., and 74 Chambers street, New York, represents their line of goods with the latest additions, including Pratt's Blind Opener, Turning Web, Adjustable Lever Corkscrew, Pratt's Carpet Stretcher and the Goodell Lathe.

The following is the discount sheet of the Stoddard Lock and Mfg. Co., 104 Reade street, New York, relating to their new catalogue, to which we called attention in our last issue:

No. 1, Hasp Locks, size 2½ x 1½ inch..... 30

No. 2, Hasp Locks, size 2½ inch, Pad..... 30

No. 3, Hasp Locks, size 5 x 1½ inch..... 30

No. 4, Hasp Locks, size 7½ x 1½ inch..... 30

No. 401, Eureka Padlocks..... 30

No. 402, Eureka Padlocks..... 30

No. 15, Recess Locks, Brass or Nickel..... 30

No. 20, Chest Locks, Brass or Nickel..... 30

No. 25, Cylinder Locks, Brass or Nickel..... 30

No. 26, Cylinder Door Locks..... 30

No. 30, Sash Fastener Burglar Proof..... 50

No. 50, Key-Hole Drawer Pulls, Gilt or Nickel..... 30

No. 51, Key-Hole Baile Pulls, Gilt or Nickel..... 30

No. 25, Strikers, Brass or Nickel..... 30

No. 60, "Practical" Window-Sash Fasteners..... 10

No. 70, Patent Crystal Water Filter, 36 per doz..... 30

No. 85, Patent Cleveland Water Filter, Nickel Plated, 36 per doz..... 30

No. 90, Ross Inside Catch..... 50

No. 80, Patent Silver-Plated Hat Hangers, According to Quantity.....

Gross..... 1 10 50 100

Net per gross..... \$4.00 3.50 3.00 2.50

No. 2000, Magic Pocket Knives, per doz., net..... \$2.50

No. 2200, Magic Pocket Knives, large size, net..... 2.50

No. 2300, Magic Pocket Knife and Automatic Pencil net..... 4.50

A. H. Dodd, Hudson, N. Y., announces,

September 26, that, having purchased the entire interest of the Dodd & Rice Mfg. Co., he will hereafter attend to all business connected with the same. He also alludes to the "Little Gem" Window Blind Worker, of which he is patentee and manufacturer, as an article giving satisfaction.

Tower & Lamont, Rochester, N. Y., call the attention of the trade to their new Razor

Strop, the "Lamont." This is a combination square Belt Strop without Screw or Nut, and among the advantages claimed is that of greater durability and the fact that the Belt is held at a proper tension by means of a strong Steel spring, which is referred to as giving it a peculiar elasticity.

Under date September 19, Hibbard, Spencer, Bartlett & Co., Chicago, send out a 36-page circular intended for fall and winter reference. The first page, as usual, is devoted to Tin Plate and Tinner's Supplies. Then follow Sleigh Bells, Skates, Hand

Sleighs, Axes, Lanterns, Oil Cans, Carving Knives and Forks, Husking Pins, Hay Knives, Cross-Cut Saws, Steel Traps, Ground and Gray Enamelled Hollow Ware, Copper Kettles, Waffle Irons, Scoops, Draining Tools, Meat Cutters, Sausage Stuffers, "Eureka" Tool Chests, Steel Wire Nails, Stove Boards, Coal Hods, Stove-Pipe, Dampers, Weather Strips, Stove Carriers, Stove Trucks, Barn-Door Hangers, Guns and Sheet Iron. The accustomed place is given to gratuitous advertising for their patrons.

The John Fearnley Mfg. Co., manufacturers of Wheelbarrows, Trucks, &c., Cincinnati, Ohio, sustained serious damage to their factory by fire last Saturday night. The loss on the building, stock and Machinery is estimated at about \$10,000, which was partially covered by insurance. They had not been long in their new quarters. It is intimated that they will make immediate arrangements to fill their orders and lose no time in getting in shape again.

The Richmond Weather Strip Company, of Richmond, Ind., were awarded a diploma at the recent Iowa City Fair on their "Perfection" Weather Strip.

The American Mfg. Co., Waynesboro, Franklin County, Pa., issue a 64-page descriptive catalogue of their American Fruit Evaporator. They refer to the fact that the increasing sale of the American Evaporator has led them to increase their manufacturing facilities, until now they have a very extensive and well equipped establishment. In addition to a description of the recent improvements in their Evaporator, the catalogue contains considerable practical information bearing on the fruit-drying industry.

The Manhattan Hardware Company, Reading, Pa., give their prices, October 1, on page 24, with it, will be seen, a revision of former quotations. Their notice to the Hardware

Solid Cast-Steel Carriage Ironers' Hammers, Full Polished.

No. 281	282	283
Weights, 3 lbs. 2 oz.	2 lbs. 10 oz.	3 lbs. 2 oz.
Per doz. \$12.50	15.00	17.50

Solid Cast-Steel Chipping Hammers.

No. 110	111	112
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$7.00	8.00	9.00

Solid Cast-Steel Machinists' Octagon Pattern Ball-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 130	131	132
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$11.00	11.00	11.00

Solid Cast-Steel Machinists' Octagon Pattern Straight-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 133	134	135
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$12.00	13.00	14.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 136	137	138
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$15.00	16.00	18.00

Solid Cast-Steel Machinists' Octagon Pattern Straight-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 139	140	141
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$15.00	16.00	18.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 142	143	144
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 145	146	147
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 148	149	150
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 151	152	153
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 154	155	156
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 157	158	159
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 160	161	162
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 163	164	165
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 166	167	168
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 169	170	171
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 172	173	174
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 175	176	177
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 178	179	180
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 181	182	183
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 184	185	186
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 187	188	189
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 190	191	192
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 193	194	195
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 196	197	198
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 199	200	201
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 202	203	204
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 205	206	207
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 208	209	210
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 211	212	213
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 214	215	216
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 217	218	219
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Machinists' Octagon Pattern Cross-Pane Hammers, Oil Finished, Polished Face and Pane.

No. 220	221	222
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Full Polished and Handled.

No. 223	224	225
Weights, 1 lb. 4 oz.	1 lb. 10 oz.	2 lbs.
Per doz. \$16.00	17.00	20.00

Solid Cast-Steel Wood Choppers' Mauls, Oregon Pattern, Oil Finished.

No. 226	227	228
Weights, 3 to 10 lbs., per pound		
Per doz. \$0.60		

Solid Cast-Steel Wedges, Truckee Pattern, Forge Finished and Oiled.

No. 229	230	231
Weights, 3 to 10 lbs., per pound		
Per doz. \$0.25		

Solid Cast-Steel Wedges, Polished Points, Painted Red.

No. 232	233	234
Weights, 3 to 10 lbs., per pound		
Per doz. \$0.25		

Solid Cast-Steel Railroad Track Chisels.

No. 235	236	237
Weights, 3 to 10 lbs., per pound		
Per doz. \$0.50		

Solid Cast-Steel Furriers' Pincers, Oil Finished Extra Heavy.

No. 238	239	240
Length, 12 in., per doz.		
Per doz. \$50.00		

Solid Cast-Steel Hoof Nippers, Oil Finished.

No. 241	242	243
Length, 12 in., per doz.		
Per doz. \$42.50		

Solid Cast-Steel Blacksmiths' Tongs, Straight Lip.

No. 244	245	246
Lengths, 12 in. 14 in. 16 in. 18 in. 20 in.		
Per doz. \$5.75 6.75 7.75 8.75 9.75		

Solid Cast-Steel Blacksmiths' Tongs, Curved Lip, Fluted Jaw.

No. 247	248	249
Lengths, 22 in. 24 in. 26 in. 28 in. 30 in.		
Per doz. \$11.00 12.00 14.00 15.75 17.50		

PATENTS ON ICE CREEPERS.

In the litigation in which the Scott Mfg. Co., of Baltimore, Md., are complainants against Louis A. Sayre, Newark, N. J., defendant, for an alleged infringement of their patent for an improvement in Ice Creepers, a decision has been rendered in the United States Circuit Court, District of New Jersey, by Judge Nixon. The opinion of the Judge, which we give below, will be read with interest, not only for its bearing upon the case in question, but for the general principles of law which are enunciated in it. The decision, which, it will be noticed, is in the defendant's favor for the reasons stated, is as follows:

This suit is brought on Letters Patent No. 192,057, dated June 19, 1877, and issued to Charles P. Dewey and Robert P. Scott, for "Improvement in Ice Creepers."

The complainant alleges the infringement of the first and third claims of the patent, both of which are combination claims.

The elements of the combination of the first are a calk-plate, a rod or spindle and adjustable jaws.

The third claim has the same elements, to which is to be added a locking device consisting of a spiral spring on the rod or bolt to hold the calk-plate in position.

I have no doubt that the mechanism of the Ice Creeper of the defendant infringes the patent of the complainant. There are some minor differences, but the constituents and mode of operation of the two are substantially the same. Both are fastened to the heel of the shoe by a screw-clamp. Both have the reversible calks, which, when adjusted for use, extend to a greater or less extent over the area of the under side of the heel, and when in their inoperative positions are turned or folded under the instep of the shoe.

In each the calks move upon a rod extending across the shoe, the rod being provided with a thread and thumb, and having clamps—one fixed and the other free upon the rod—the whole being rendered efficient by a locking device which is a spring surrounding the rod.

The real question in the case, and the one principally noticed at the final hearing, is whether the combinations of the patent are, in fact, patentable.

There seems to be a growing sentiment among inventors that the Supreme Court in its more recent decisions has become—I will not say more exacting—but less liberal in its construction of patents for a combination. Such cases as the Pennsylvania Railroad Company vs. Locomotive Company, 110 U. S. 401; Phillips vs. Detroit 111 U. S. 604; Tack Company vs. Five Rivers Mfg. Co., 109 U. S. 117; Hollister vs. the Benedict & Co. Company, 113 U. S. 58; Thompson vs. Boisselier, 114 U. S. 1, are quoted in support of this view. Whether true or not, it is my duty to examine the present claims in the light of these decisions, and to give them such interpretation and effect as the deliberate judgment of that court declares they are entitled to.

Speaking generally, a person to obtain a valid patent must have invented or discovered some new and useful art, machine, manufacture or composition of matter, or some new and useful improvement thereof (Section 4886, Revised Statutes).

It is not easy to obtain a satisfactory definition of a patent for a combination. It is not necessarily affected by the fact that all the elements forming it are old. They may be old and yet so arranged in combination that by their co-action a new and useful result may follow. But there must be a co-action among them to take the case out of the category of a mere assemblage or aggregation of parts. In Reckendorfer vs. Faber, 92 U. S. 347, the Supreme Court said: "The combination to be patentable must produce a different force or effect or result in the combined forces or processes from that given by their separate parts. There must be a new result by their union; if not so, it is only an aggregation of separate elements."

In the later case of Pickering vs. McCullough, 104 U. S. 310, they took a step in advance and held "that in a patentable combination of old elements all the constituents must so enter into it that each qualifies the other. It must form either a new machine of a distinct character and function or produce a result due to the joint and co-operative action of all the elements, and which is not the mere adding together of separate contributions; otherwise it is only a mechanical juxtaposition, and not a vital union."

Merwin in his valuable work on "The Patentability of Inventions," in commenting on this last case (p. 401), remarks that "it may be gathered from this that in a patentable combination there must be a new interaction of some sort between the several elements. It is not sufficient that one element is ineffective without the others; that its function is useless except in combination with other functions; but the function of one must be modified in some way by the function of another so that the function of

one element is not the same in the combination that it was in the place whence it was taken; a peculiar function must be developed in the combination; this need not be true of every element in the combination, but it must be true of one element or several elements, and the virtue of this combination must inhere in this peculiarity of function developed by it.

I fear that the complainant's patent cannot stand this test. It is clear that all the elements are old. The records of the patent office furnish a large number of patents for Ice Creepers of every style and variety.

The state of the art shows that the patentee, by searching among these, could have selected all the constituents of his combination. Without stopping to designate the particular patent from which the separate part or element is taken, I think he could have found everything embodied in his alleged invention or its mechanical equivalent in the patent of Monnin, in 1868; of Krauser, in 1863; of White, in 1867; of Green, in 1865; of Richardson and Morse, in 1866; of Farley, in 1863; of Turner, in 1871; of Earle, in 1873; of Cone and Furniss, in 1876; and in the defendant's Exhibit No. 19, which reveals the mechanism of Ice Creepers sold in Cincinnati in the open market as early as 1869.

As before stated, a patent for a combination is not invalid because all the parts are old. But merely assembling them together, or placing them in juxtaposition, does not indicate invention.

Some new or peculiar function produced by such a combination must be developed. Unless this follows, the new arrangement is the mere exhibition of mechanical skill.

It appears to me that the difficulty about the complainant's patent as a combination is that none of the parts shown in the construction perform any different function than they had performed in other patents or combinations.

For this reason I am constrained to hold that upon the evidence and the law the case is with the defendant.

The bill must be dismissed.

Metal Market.

Copper.—There has been a moderate business done on the spot at firm prices, the stock on hand not being over-large. We quote at the close: Lake Superior, 11¢ @ 11½¢; Electrolytic, 11¢, and other brands, 10½¢ @ 10¾¢. Meanwhile Chili Bars in the London market first gave way to an unprecedented low figure, £40. 5/, but subsequently recovered. The fluctuations therein were as follows: September 24, £40. 17/6; September 25, £40. 15/; September 26, £40. 7/6; September 28, £40. 5/; yesterday, £40. 12/6, and this morning, £40. 13/.

Best Selected kept steady, £46. 10/. Our special cable dispatch this afternoon states that the market is a little weaker. In Russia the tin on Copper Ore is to be raised from 4 copeks to 32 lb to 1 ruble (from 10¢ to 100 lb American to \$2.34).

It seems that stupendous frauds have been committed under cover of this duty on Ores, under which compounds were imported containing 80% Copper and paying a duty of 4 copeks, where it should have been 1.20 ruble. It is hoped that henceforth the Copper mines of Russia will be developed; last year it is estimated they only turned out 400 tons fine, as shown in the table below, just published by Messrs. Henry M. Merton & Co., London, of the world's Copper production:

	1882.	1883.	1884.
Tons.	Tons.	Tons.	Tons.
Australia.....	8,990*	12,000*	13,300*
Bolivia.....	3,259	1,680	1,300*
Cape of Good Hope.....	5,000	5,000	5,000
Chili.....	42,909	41,099	41,648
Germany.....	14,516*	17,148	18,082*
England.....	3,464	3,000*	2,500*
Japan.....	2,800*	5,600*	6,000*
Newfoundland.....	1,500	1,053	668
Norway.....	2,590*	2,630*	2,706
Russia.....	3,000*	4,000*	4,000*
Spain and Portugal.....	38,774*	43,652*	45,600*
Venezuela.....	3,700	4,016	4,600
United States.....	39,390	52,080	63,950
Other countries.....	4,691	3,998	2,870
Grand total.....	175,853	198,556	211,613

* Estimated.

For manufacturers in this market dealers ask 16¢ for New Sheathing Copper, 14¢ @ 14½¢ for Braziers, 15¢ for Bolts, and 15¢ for Bottoms. American Yellow Metal Sheathing and Nails, 11½¢; Rod, 15¢, and English, in bond, 13¢.

Tin.—London has recovered a little from the late drop, and is this morning doing £92, spot Straits, and three months' do., £91. 5/.

The market here has been irregular, influenced in part by the necessities of speculators to perfect deliveries before the close of this month, and we are firm at the close at 20¼¢ @ 21¢, spot Straits. We are cabled from London this afternoon that the market is firmer. Tin Plates.—Our market has been firm and moderately active, at rather firmer prices.

We quote at the close, large lines, ordinary brands, 3½¢ box: Charcoal Bright, \$5 @ \$5.62½; do. Termes, \$4.37½ @ \$4.62½, and Coke Tin, \$4.55 @ \$4.70. The Liverpool stocks are very much reduced, which causes a strong feeling. They quote: Charcoal, 16/6 @ 17/6, and Coke Tins, 14/6. From London we are told that the market is steadier.

Lead.—Since the larger dealings of the previous week our

L. COES'
GENUINE IMPROVED
Knife Handle
PATENT
Screw Wrenches
MANUFACTURED BY
L. COES & CO.,
Worcester, Mass.
ESTABLISHED IN 1839.




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Registered March 31, 1874.

Sectional view illustrates our NEW KNIFE HANDLE, showing Malleable Iron Frame and Shank of Bar keyed into position.
Straight Bar, Extra LONG NUT FOR SCREW IN JAW.

The Best Made and Strongest Wrench in the Market.
Send for Illustrated Price List and Circular.

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GENUINE BRONZE AND IMITATION BRONZE KNOBS, &c., &c.
Mathes' Patent Burglar-Proof Sash Locks.
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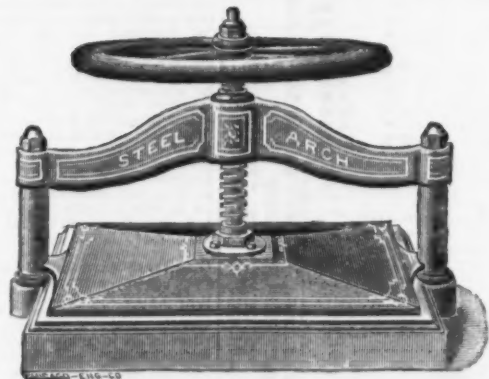
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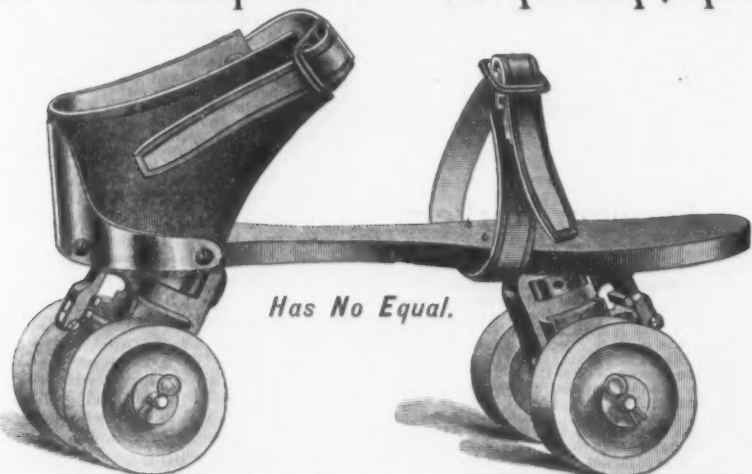
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Finished in Black and Carmine, with Bronze Ornamentation.

The PHILADELPHIA NO. XX ROLLER SKATE



Has No Equal.

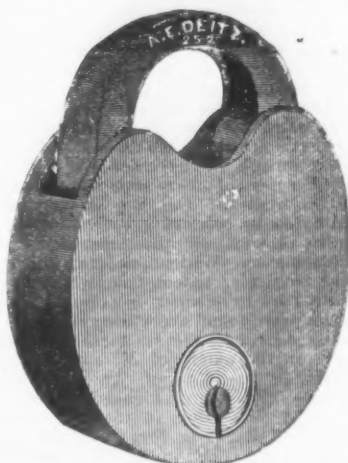
Showing Style of Phila. No. XX Rink Skate. Sizes running from 7 1/2 to 12 inches.

With this Skate it is possible to describe the smallest circle; do the fastest skating with greater ease than can be done upon any other skate upon the market.

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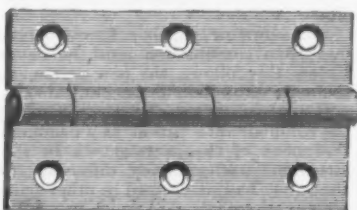
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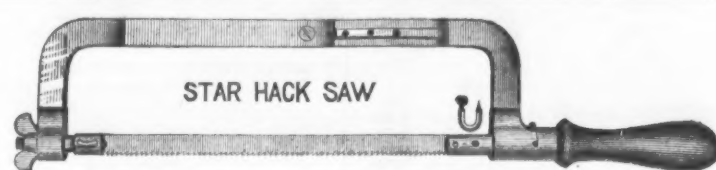
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These STAR HACK SAWS are the only thing in our list for which the demand is steadily and rapidly increasing in these dull times. Every dealer who orders them is sure to increase the number in his second order. They will be in universal demand, and every store in the land can sell them at a profit, besides giving great satisfaction to their customers.

There is no risk in handling them, as we will take back every one which is not wanted, whether bought of us or some other dealer. We guarantee them to do double as much cutting as any other kind in market.

Length of Blade, 6, 7, 8, 9, 10, 11, 12, assorted, 6 to 9.
Price per dozen, 55, 60, 65, 70, 85, 95, 105, 65 cents.

STAR HACK SAW FRAMES.

WITHOUT BLADES.

No. 0 extension frame, to hold 10, 11 and 12 inch, steel polished and nicked..... \$12.00
No. 1 extension frame, to hold 6, 7, 8 and 9 inch, steel polished and nicked..... 9.60
No. 2 solid frame, to hold 8 inch, steel polished and nicked..... 8.40
As seen in the cut, these frames are all made adjustable, so as to face the blades in four different directions. They also have the patent staple-shaped pins to hold the blades in the frames, which are so arranged that they cannot fall out.

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CHAMPLAIN
Forged Horse Nails.
MANUFACTURED BY THE
NATIONAL HORSE NAIL CO.,
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HOT FORGED AND COLD HAMMERED POINTED MADE OF BEST
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THE WEEK.

The explosion at Flood Rock, General Newton says, will take place on or about October 7. He denies that any delay has occurred arising from the corrosion of cartridges, as was lately rumored.

The striking ironworkers at Cleveland have unanimously decided to return to work, on the advice of the strikers' committee. As the mills do not require the employment of the entire force, the turbulent foreigners have been excluded. The mills of the Cleveland Rolling Mill Company will henceforth be worked on a new plan which contemplates the abolition of the "boss" system and the letting of each department under contract, the owners thus escaping all responsibility for the management of the mills.

New Orleans papers represent that there is a very considerable movement of white population from the North and Northwest toward the South, apparently attracted by the reviving prosperity of the cotton States. The movement, we are told, is not confined to any particular class or avocation, but of mere labor unidentified with some fixed employment little has been received, as it is well known that the South is no place for the unskilled.

The effects of the bankrupt shipbuilding firm of Ward, Stanton & Co., at Newburg, were sold at auction for a trifling amount. The yard was purchased previously by Jas. Bigler, who is now conducting it.

In the halcyon days of American shipbuilding, the Bath, Me., wharves were crowded with new ships. In 1854, 35 vessels, 11 of them from 1080 to 1580 tons register, were launched here. At one time in this period 25 square-rigged vessels lay at the wharves receiving sails and outfits. Today in all the yards of Bath only three large vessels are being built. Two of these are being built on contract, and it is a fact that carries a sad story with it that but one of the old shipbuilding families shows its faith in the future of American shipping by building at the present time.

The large silk mill of Samuel Pope, in Paterson, N. J., was burned last week, throwing 600 hands out of employment. The fire is supposed to have originated from a furnace used in repairing the roof.

A new building to accommodate 400 pupils is to be erected on Girard College grounds. The cost will be \$138,000.

Speaking of the extent of the glass trade in Pittsburgh, a manufacturer says: "Probably the greatest victory of the glass trade is the cutting off of almost the entire export trade of England with America. Pittsburgh can justly claim the greater share of the glory. She not only has equaled England in the quality of her goods, but has in some instances excelled her in that respect and in novelty of design. The trade reaches to all parts of the country. We can pay the 30 per cent. duty levied by Canada and still undersell the market there."

The Treasury Department has issued a circular to customs officers respecting the guilty connivance of passengers and customs inspectors in the use of money at examinations of baggage. Existing laws are supposed to be adequate to the punishment of offenses of this character.

The fact that an organization so numerous and so influential in its membership as the Knights of Labor favors arbitration for the settlement of labor disputes is regarded as an encouraging sign.

Advices received from Moscow, Russia, direct state that the work and usefulness of the United States consulate there are constantly increasing. Notwithstanding the political troubles which involve and agitate Russia, our consul to the ancient capital, E. G. Van Riper, is arranging some large business affairs between the two countries, and developing a trade which, owing to the great importance of Moscow as a manufacturing, distributing and consuming center, should attain to large proportions.

An important commercial convention has been agreed upon between Peru and Bolivia, by which all goods for Bolivia are to be entered free of duty through Mollendo, and all Bolivian products may be exported at the same place under the same privilege. This will have the effect of diverting the current of Bolivian imports and exports from Tacna and Arica, since by this new arrangement the railway to Puno and steamers on Lake Titicaca may be employed as transportation in place of the long mule-back journey over the Cordilleras.

An old Sandy Hook pilot does not believe in dredging or otherwise meddling with the natural channel of New York harbor. He expresses himself as follows: "There is just as much water in the shoalest part of our channel as there was 40 years ago, when I was a boat-keeper. There is all the water we want for practical purposes. There is not an American man-of-war or merchantman that cannot come in or go out of New York harbor with very little detention. Have you heard any complaint from the Navy Department or the American shipowner? No. This is a blasted English scheme to let in their Great Easterns at any time of tide, and, as Captain Samuels so pertinently put it, to allow them to build deeper

ships, as they can build them no wider and enter their own dock gates abroad. The Congressman that would vote for an appropriation to interfere with the natural current and formation of the channel in our harbor ought to be sent to the penitentiary for life."

A flotilla of about a dozen steam tugs, furnished with powerful Knowles and "Niagara" pumps for fire-extinguishing purposes, was organized not long ago for service on the water front, by the Pennsylvania Railroad Company, and the system was found to work admirably at the recent fire on the Rotterdam steamship pier, in Jersey City. Besides the pumps several of the tugs are fitted with what is known as the "D. A. Woodhouse Siamese coupling," a device whereby several of the streams may be forced through one nozzle of great volume and strength.

The Mexican Government has arranged to begin paying its deferred debt to the National Bank, assigning a certain percentage of the public revenue to that use.

Lawrence J. Fitzgerald, candidate for State Treasurer, only a few years ago was a mechanic at his bench. He now employs 1000 men, and his factory buildings at Cortland are conspicuous among the workshops of the State.

The effects of silver becoming the standard of value in trade are the subject of remark by the editor of the leading commercial journal in New York, who says: "The moment gold bears a premium, no matter how small, every gold piece will go at once out of circulation, and the paper, both of the Government and the banks, and the debts due depositors will be redeemed in nothing but silver. Silver will then be the sole standard, and the relative value of gold will depend on the extent of the demand for it for shipment and for hoarding. There being now no demand for gold for export, \$1000 of gold is worth no more in the market than 1000 silver dollars, worth but \$800, or 2000 silver half-dollars worth but \$749, as each of these is just as good to pay a debt in this country as the gold. Of course, if silver came to be the standard, prices of all commodities, including wages, would adjust themselves to the new relation, ruling higher in nominal value, subject, however, to be affected by the possible interruption of trade, general depression in business enterprises and universal want of confidence in the stability of financial affairs."

Mr. Cramp, the iron shipbuilder of Philadelphia, is reported as expressing himself very hopeful of Congressional action next winter, in response to a general appeal in favor of adopting the French bounty system. Mr. Cramp, if correctly quoted, is liable to be disappointed.

In Michigan, the greatest lumber producing state in the Union, the first sawmill was erected about 50 years ago. At that time it was estimated that there were 150,000,000,000 feet of white pine standing in the forests of the State. The estimate for 1885 is 35,000,000,000 feet, which shows it has disappeared at the rate of 2,300,000,000 feet annually for 50 years. The estimated amount cut into lumber in Michigan in 1884 was 5,100,000,000 feet, board measure, which is about one-sixth of the whole amount cut in the United States for that year.

The journeymen plumbers of New York demand that nine hours shall constitute a day's work, and if employers resist they propose to establish co-operative shops of their own.

The spires for St. Patrick's Cathedral, in this city, will cost, according to the architects' computation, \$190,000. The lower part, or tower, will be octagonal in shape, and 67 feet high, with a base of 32 feet. In each of the eight sides will be a window. Rising from this tower will be the spire itself, also octagonal.

The Merchants' and Manufacturers' Association has been organized in Cincinnati, with the object of promoting mutual acquaintance and to inculcate "liberal and broad ideas."

A portion of Quebec is to have the electric light, with motive-power generated at the Montmorency cataract.

The census statistics of Massachusetts, soon to be published, will show that the State has gained about 300,000 inhabitants since the census of 1875, or about 200,000 since the United States census in 1880. The increase has been largely in cities. Boston will not reach the expected 400,000.

The late Samuel Robinson, senior partner of the well-known coal firm of Robinson, Hayden & Co., was buried the 25th inst. at Elizabeth, N. J. Among those present were many prominent railroad men and delegations from the coal and iron trades.

The record of the milling year at Minneapolis, which closed September 1, shows a large increase over the business of the preceding year. During the year the total flour product was 5,450,163 barrels, as against 4,797,340 in 1883-84, an increase of 652,823. The shipments were 5,298,541 barrels, against 4,814,424 for the year previous.

The plans for the four new cruisers authorized by the last Congress, together with the report of the marine architects appointed to examine and pass upon their merits, have

been laid before the Secretary of the Navy to await his action.

General Carr, candidate for Lieutenant-Governor of the State of New York, is head of the firm of J. B. Carr & Co., chain cable makers, of Troy, N. Y.

London Iron is expecting no "boom" in the English market as a consequence of the construction of railways in China, but it suggests the wisdom of taking steps to cut loose from suicidal engagements with steel-rail makers in Germany and Belgium, in order to be prepared for a possible movement.

Ex-Secretary Chandler made John Roach a final payment of \$76,000 on the monitor Puritan without a trial, as specifically required by the contract. The Fourth Auditor of the Treasury now refuses to pass the voucher.

The customs revenue derived from dutiable goods by the Dominion Government during July and August decreased \$400,000 compared with the corresponding period last year.

The Howe Sewing Machine Company, of Bridgeport, have gone into a receivership, with \$750,000 outstanding obligations, of which \$600,000 are secured. About \$30,000 are due to employees.

A correspondent, writing from Manchester, England, speaks of the deplorable condition of trade. Competition from Germany is disastrous. "But," he adds, "it is not Germany alone. It is the whole world. Every country is becoming its own manufacturer. The colonial dependencies are shutting out the goods of the mother country by competition and even by the levying of a tariff on imports from that maternal ancestor. The largest shippers in Manchester are Germans. Their warehouses are the largest and broadest, and other warehouses are hidden in the shadow of their superior height. Walking about the city with an Englishman in the shipping trade, he boiled with indignation as he pointed out to me those immense buildings, every one of which bore the name of one or more Germans. The Germans are now larger shippers to India than the English. The latter, after many losses, refused to longer send goods to India on consignment. Wealthy German firms stepped in and offered to consign goods to an illimitable amount, at their own risk, and so they naturally and inevitably stole away a great portion of the trade."

M. Clarin de la Rive, hailing from Burgundy, has just completed an aerostat in Paris which he claims will be infinitely more manageable and practicable than anything yet invented. The War Office authorities who watched the trials at the Camp of Chalais seem satisfied that the problem has been solved, but experts intimate that the cost of working Captain Renard's balloon is prohibitive, neither can the apparatus be controlled for a long interval of time.

The joint conference committee of Western window-glass manufacturers and workmen, appointed to arrange a scale of wages for the coming year, met on the 22d ult. in Pittsburgh. After discussion the matter was placed in the hands of a sub-committee, with authority to settle differences. The factories have been closed since June.

It is said that Diamond Jo Reynolds has been visiting New York for the purpose of contracting for steel with which to build the first steel passenger steamboat ever put on the Mississippi River. His enterprise, it is predicted, will mark a new era in steamboating on the Mississippi. He intends to build a boat for the St. Louis and St. Paul trade, after the style of the Pilgrim, of the Fall River Line. It will be over 300 feet long and be built at Dubuque.

The machinery for Mr. Bush's experimental yacht lying at Poillon's Dock, in Brooklyn, is being made of annealed steel at Pittsburgh. "One who knows" says the motor will be a compound which explodes 80 times a minute under water, and drives the yacht ahead by the concussion.

Shipowners who have sailing vessels at San Francisco are pleased to know that freights in that port are brisk at 30/.

Congress will be asked to appropriate \$700,000 for the construction of a dry dock at League Island, about 700 feet in length, suited to the dimensions of the new cruisers.

At the American Forestry Congress, recently in session in Boston, some very valuable statistics were presented relative to the timber supply of this country. The land area of the United States is placed at 1,856,070,400 acres; total forest area, 440,990,000 acres; total farm area, 295,650,000 acres. Of unimproved and waste lands, including "old fields," there are 1,115,430,400 acres. There are 150,000 miles of railway, including side tracks. It has required 396,000,000 ties for their construction. Supposing that the ties require to be renewed once in six years, and that 10,000 miles of new road are built annually, if 25 years be allowed as the time necessary for trees to attain a size suitable for making ties, then it would require 15,000,000 acres of standing timber to supply the annual demand for ties. But with the increase of railroads it is to be considered that the annual demand for ties is all the while increasing. The census reports the consumption of 145,778,137 cords of wood

and 74,000,000 bushels of charcoal for fuel in dwellings, stores, factories, steamboats and locomotives. This in a single year would clear the forests from an area of 30,000,000 acres. The census also reports that in 1880 forest fires consumed the trees on 10,274,089 acres, and there is no reason to believe that a less area will be burned over than in 1880. The census gives the amount of lumber cut in 1880 as 18,000,000,000 feet. Last year the cut had increased to 28,000,000,000 feet, which would lay bare an area of 5,600,000 acres. Altogether, it appears that the forests of the country are subject to an annual drain of 50,750,089 acres. It may well be inquired how long the forests can endure this drain, how long the country can bear this rapid destruction of the most important material element of its prosperity.

The Government of Chili is pressing the fulfillment of the contract for the Aranco Railway. The contractor for the San Javier and Tome Railroad has informed the President that the \$5,000,000 required for the project has been raised in London.

The French Ministry of Marine have devised a vast scheme of coast defense, the cost of which is estimated at \$200,000,000. It is proposed to construct strong permanent works in all the important commercial ports, and earthworks of both kinds in all the harbors. Defensive works are to be efficiently masked and armed with powerful ordnance. It is next proposed to lay down along the whole line of coast a series of submarine mines to ward off attacks from the enemy's fleets or single vessels. The construction of a large number of fast torpedo boats and gunboats and small unarmored cruisers of great speed is also intended.

The total number of immigrants arrived in the United States during the month of August, as shown by the Bureau of Statistics, is 26,298, against 29,500 for August, 1884, and the total for the last eight months is 241,035, as compared with 303,054 in the same time last year.

The torpedo boat David Benschell, to be used in laying torpedoes and wires at Wille's Point, was launched at the Continental Iron Works on Saturday. She measures on the keel 82 feet. The hull is composite, having a steel frame of angle bars 18 inches apart, 5-inch steel deck beams. She has a pair of inclined engines, the diameter of cylinder being 14 inches and the stroke 15 inches, which can be run at either high or low pressure. The boiler, which is made of steel, is of the return tubular pattern, 10 feet long and 8 1/2 feet in diameter. It can carry 100 pounds of steam. The engine, reversible propeller and small engine are all worked directly from the pilot-house. The engineer has nothing to do with working the engine. The Mallory propeller-wheel enables the boat to turn on its own center. The propeller-shaft is within a circular box which is under water at the stern of the boat. This box can be turned at will by the pilot, and thus point the propeller-wheel in any direction.

Sir Lyon Playfair, in his recent address before the British Association, said the steam-power of the world has risen during the past 20 years from 11,500,000 to 29,000,000 horsepower, or 152 per cent.

Workmen in Philadelphia are much chagrined by the orders of Secretary Whitney, directing that the League Island Navy Yard shall be closed, agreeably to the recommendations of the commission appointed by the last Congress. The law provides that no vessel shall be repaired when the cost of the work exceeds 20 per cent. of the original price of the ship; therefore, very few of the cruisers out now will be worth touching when they return. The Lackawanna and Wachusett recently arrived at Mare Island, and a survey shows that the cost of repairing them will be over 20 per cent.; therefore they have been condemned to "rotten row," as they call it in the department, and will be sold. A majority of the vessels needing repairs are at the Brooklyn and Norfolk yards, where they will be kept.

Torpedoes and other obstructions are being removed from the Chinese treaty ports. In Korea affairs are unsettled, but foreign residents feel no special anxiety.

A canvass of the Western and Southern States for expressions on the silver question, instituted by a Chicago newspaper, brought out 120 reports from bankers, merchants and farmers, in which the weight of testimony favors at least a temporary suspension of silver coinage.

The order of United American Mechanics, at their convention in this city, reported a balance of \$565,210 in their treasury. The membership numbers 20,000.

The Chilean customs revenue for August amounted to \$2,122,467, showing an increase of \$342,179 over the same month last year.

Major Heap, of the Lighthouse Board, Washington, proposes to construct a powerful incandescent lamp, rich in red and yellow rays, which are proved to be the most fog-penetrating. The lamp is expected to possess great efficiency in lighthouse illumination.

Secretary Manning settled the controversy over the contract for repairing the revenue steamer Crawford, at Baltimore, by awarding it to the Columbia Iron Works and Dry Dock Company, of that city, represented by

Mr. Malster, at their bid of \$17,200. An interesting labor question is involved in this action. A vigorous protest against his receiving the contract was made by the shipwrights and calkers of Baltimore on the ground that he proposed to employ imported cheap labor in executing the work. In a memorial to Secretary Manning on the subject they say the award to Mr. Malster will be a direct insult to honest American labor, and will be regarded as an alliance on the part of the Administration with capital against the laboring classes.

Plans have been completed for the erection of a permanent exposition building in Pittsburgh on the site of the old exposition building, which was destroyed by fire three years ago. The structure is to be built entirely of glass and iron, and will cost \$200,000.

"One of the ablest business men in Boston" attributes the promised return of prosperity to the industrial development of the South, which within the last three or four years has made a perceptible impression on the national welfare.

The San Francisco Herald says: "It is to be regretted that we have for the time being lost the China market for quicksilver, the Rothschilds having for a year or more past taken possession of that lucrative trade, and seem determined to control it at all hazards, thereby causing a lessened production in California and reducing the price to a figure so low that many of our mines have been compelled to cease operations entirely, having closed down for a season and with little prospects of an early resumption."

Augustus H. Farlin, of Elizabeth, N. J., superintendent of the New Jersey Zinc and Iron Company, of Newark, was killed on Sunday night last by falling into the cellar of his residence, on Railway avenue.

California shippers of wheat have revised their estimates of the quantity available for export, and now raise the total to 800,000 tons or, say, 26,000,000 bushels, including 3,000,000 bushels from Oregon.

The result of special investigations by the Cincinnati Price Current concerning the probable supply of hogs in the West for winter marketing is summed up in an estimate that, compared with last year, the general average is 97 per cent. In other words, that the supply will be 3 per cent. less for the coming winter than it was last season. Last winter's packing in the West was 6,460,000 hogs, compared with 5,402,000 in 1883-84. The present summer season, ending November 1, bids fair to reach about 4,600,000 hogs, against 4,059,000 last year.

The Pacific Mail Steamship Company give notice that, dating from October 1, they will cease to receive on any of their steamers or offices any letters except such as are destined for countries with which the company have contracted to carry outward mails, and except such as relate to the cargo on board of any of the company's vessels.

The deficiency in the revenues of the United States Post Office Department for the fiscal year ending June 30, 1886, will probably be \$6,000,000, which has been exceeded only three times in the history of the department, and it is feared the receipts will fall off from \$7,000,000 to \$8,000,000.

Prominent Dominion officials state that immigration returns for the current year will show a falling off of over 50 per cent. as compared with 1884, and that the total number of immigrants during the past 12 months will not reach over 50,000.

The great granite building for the State, War and Navy departments is approaching completion. It covers 4 1/2 acres of ground, and will cost about \$10,250,000. The only wood about it is in the floors, laid over the stone for comfort, and in the doors, which are of mahogany, hung in iron casings.

Speaking of the great race for the America cup, the London Post says: "The general result of the series of races in which the Genesta sailed goes to show that in the Puritan the American yacht builders have turned out an extraordinarily fine specimen of the racing yacht. Although it is unlikely that we shall adopt the American system in its entirety, there is little doubt that English yacht builders may profit by a study of the lines of the now famous Boston sloop."

The sugar crop in Hayti is the best in six years, being 8,000,000 pounds above the heaviest crop obtained during that period.

The Halifax City Council has accepted the offer of the Halifax Graving Dock Company to construct a dry dock at that port on the guarantee of a subsidy of \$10,000 per annum for 20 years by the city, the British Admiralty having already agreed to pay that sum, and the Dominion Government being expected to do the same. The dock is to be a granite-faced one of not less than 580 feet in length, 100 feet in width at least, and 30 feet draft of water over the sill at the entrance.

The project of constructing a ship marine railway from the Bay of Fundy to Cumberland Straits for the transportation of vessels is now said to be assured. Trade by water between ports of the Gulf and River of St. Lawrence and ports in the Bay of Fundy, the New England States and the West Indies is divided into two parts by the now impassable Isthmus of Chignecto, 14 miles wide, which joins Nova Scotia and New Brunswick.

HARDWARE.

[illegible]

[illegible]

WHOLESALE METAL PRICES, September 30, 1885.

METALS.

IRON.—Duty: Bars, 8-10¢ to 11-10¢; provided that no bar iron shall pay a less rate of duty than 85¢. Sheet, 11¢ to 13-10¢. Band, Hoop and Scroll, 1¢ to 1-4-10¢. Railroad Bars weighing more than 25 lb. yard, 7-10¢ of 1¢ lb.

Standard American Pig Iron.
Foundry No. 1 X.....\$17.50 @ 18.50
Foundry No. 2 X.....\$16.00 @ 16.50
Gray Forge.....\$15.00 @ 15.50

No. 1 Scotch Pig Iron.
Lambrook.....\$18.50 @ 19.00
Coltman.....\$18.50 @ 19.00
Shotts.....\$18.50 @ 19.00
Glenbrook.....\$18.50 @ 19.00
Glenbrook.....\$18.50 @ 19.00
Glenbrook.....\$18.50 @ 19.00
Glenbrook.....\$18.50 @ 19.00
Glenbrook.....\$18.50 @ 19.00
Glenbrook.....\$18.50 @ 19.00
Glenbrook.....\$18.50 @ 19.00

Rails.
Steel at Eastern mill.....\$30.00 @ 31.00
Ord. Rails, Ts.....\$17.25 @ 17.50

Scrap.
Wrought, \$ ton, from yard.....\$18.00 @ 18.50

Bar Iron from Store.

Common Iron:
3/4 to 1 in. round and square.....\$1.6 @ 1.7¢
1 to 1 1/2 in. round and square.....\$1.6 @ 1.7¢

Refined Iron:
3/4 to 1 in. round and square.....\$1.85 @ 1.9¢
1 to 1 1/2 in. round and square.....\$1.9 @ 2.0¢

Rods—3/4 and 1-1/2 round and square.....\$1.7 @ 1.8¢
Bands—1 to 6-1/2 to 12 in. round.....\$2 @ 2.1¢
Burdens' Best "Iron, base price.....\$2 @ 2.1¢
Burdens' "H. B. & S." Iron, base price.....\$2 @ 2.1¢
Norway Nail Rods.....\$2 @ 2.1¢

Sheet Iron from Store.

Common.....\$2.70 @ 2.8¢
Nos. 10 to 16.....\$2.70 @ 2.8¢
Nos. 17 to 24.....\$2.70 @ 2.8¢
Nos. 25 to 36.....\$2.70 @ 2.8¢
Nos. 37 to 48.....\$2.70 @ 2.8¢
Nos. 49 to 60.....\$2.70 @ 2.8¢

Galvanized, 10 to 30.....\$2.70 @ 2.8¢
Galvanized, 21 to 24.....\$2.70 @ 2.8¢
Galvanized, 25 to 28.....\$2.70 @ 2.8¢
Galvanized, 29 to 32.....\$2.70 @ 2.8¢
Galvanized, 33 to 36.....\$2.70 @ 2.8¢
Galvanized, 37 to 40.....\$2.70 @ 2.8¢
Galvanized, 41 to 44.....\$2.70 @ 2.8¢
Galvanized, 45 to 48.....\$2.70 @ 2.8¢
Galvanized, 49 to 52.....\$2.70 @ 2.8¢
Galvanized, 53 to 56.....\$2.70 @ 2.8¢
Galvanized, 57 to 60.....\$2.70 @ 2.8¢

American Russia.....\$2.70 @ 2.8¢
Russia.....\$2.70 @ 2.8¢
American Cold Rolled B. B.....\$2.70 @ 2.8¢

Iron Wire.—(See Wire.)

STEEL.—Duty: Ingots, Bars, Sheets, &c., valued at 4¢ lb. or less, 45¢ ad. val.; valued above 4¢ and not above 7¢ lb., 2¢; valued above 7¢ and not above 10¢ lb., 3¢; valued above 10¢ lb., 4¢. Cold hammered or polished, in any way in addition to ordinary hot rolling, 1¢ lb. in addition to above; Circular Steel Plates, 1¢ lb. in addition to the above.

American Cast Steel.
For American Steel, see Pittsburgh quotations.

Chrome Steel.

Tool Steel, ordinary sizes, 3/4 to 3 inches, net.....\$10 @ 14¢
Adamantine Shovel and Dies.....\$8 @ 9¢
Magnet Steel.....\$14 @ 15¢

English Steel.

Best Cast.....\$10 @ 14¢
Extra Cast.....\$10 @ 14¢
Circular Saw Plates.....\$10 @ 14¢
Round Machinery.....\$10 @ 14¢
Sawed, Cast.....\$10 @ 14¢
Best Double Shear.....\$10 @ 14¢
Blister, 1st quality.....\$10 @ 14¢
German Steel, Best.....\$10 @ 14¢
3d quality.....\$10 @ 14¢
2d quality.....\$10 @ 14¢
Sheet Cast Steel, 1st quality.....\$10 @ 14¢
2d quality.....\$10 @ 14¢
3d quality.....\$10 @ 14¢

TIN.—Duty: Plates, Sheets, Tagger and Termes, 1¢ lb.; Bars, Block and Pig Iron, 1¢ lb.

Banco.....\$2 @ 2.1¢
Strait.....\$2 @ 2.1¢
English.....\$2 @ 2.1¢
Bar.....\$2 @ 2.1¢

Charcoal Tin Plates.

1 C 10x14 225 sheets.....\$7.25 @ 7.50
1 C 12x12 225 sheets.....\$7.50 @ 7.75
1 C 10x12 112.....\$10.00 @ 10.50
1 C 10x14 225 sheets.....\$7.25 @ 7.50
1 C 12x12 225 sheets.....\$7.50 @ 7.75
1 C 10x12 112.....\$10.00 @ 10.50
1 C 10x14 225 sheets.....\$7.25 @ 7.50
1 C 12x12 225 sheets.....\$7.50 @ 7.75
1 C 10x12 112.....\$10.00 @ 10.50

Coke Tin Plates.

Best.....\$4.75 @ 4.875¢
Ordinary.....\$4.75 @ 4.875¢
1 C 10x14 225 sheets.....\$4.75 @ 4.875¢
1 C 12x12 225 sheets.....\$4.75 @ 4.875¢
1 C 10x12 112.....\$4.75 @ 4.875¢
1 C 10x14 225 sheets.....\$4.75 @ 4.875¢
1 C 12x12 225 sheets.....\$4.75 @ 4.875¢
1 C 10x12 112.....\$4.75 @ 4.875¢

Terne Plates.

Prime Char. 3d quality.....\$6.875¢
Coke.....\$6.875¢
1 C 10x14 225 sheets.....\$6.875¢
1 C 12x12 225 sheets.....\$6.875¢
1 C 10x12 112.....\$6.875¢
1 C 10x14 225 sheets.....\$6.875¢
1 C 12x12 225 sheets.....\$6.875¢
1 C 10x12 112.....\$6.875¢

Tin Boiler Plates.

1 C 14x20, 2 sheets for No. 7, 112 sheets.....\$12.00
1 C 14x20, 2 " " No. 8.....\$13.00
1 C 14x20, 2 " " No. 9.....\$15.00

COPPER.—Duty: Pig, Bar and Ingot, 4¢; Old Copper, 3¢; B. B. Manufactured (including all articles of which Copper is a component of chief value), 25¢ ad valorem.

Ingot, Lake.....\$11 @ 11.5¢
Ingot, Baltimore.....\$10 @ 11¢
Ingot, Anchor.....\$10 @ 11¢
Brassiers' Copper, ordinary sizes, under 16 oz. and over 12 oz. sq. ft.....\$17 @ 17.5¢
Brassiers' Copper, ordinary sizes, under 16 oz. and over 12 oz. sq. ft.....\$17 @ 17.5¢
Brassiers' Copper, 10 oz. and 12 oz. sq. ft.....\$17 @ 17.5¢
Lighter than 10 oz. in diam.....\$17 @ 17.5¢
Circles less than 84 in. in diam.....\$17 @ 17.5¢
Segment and Pattern Sheets.....\$17 @ 17.5¢
Locomotive Fire-Box Sheets.....\$17 @ 17.5¢
Sheathing Copper, over 12 oz. sq. ft.....\$17 @ 17.5¢
Soft Copper.....\$17 @ 17.5¢
Copper Bottoms.....\$17 @ 17.5¢
Nickel Plated Sheathing.....\$17 @ 17.5¢
Plating extra.....\$17 @ 17.5¢
Flat Copper Boiler Bottoms for Pits Bottoms, cut to special sizes.....\$17 @ 17.5¢

Tinling.

14x18, by the case.....\$2 @ 2.1¢
4x18, less than case.....\$2 @ 2.1¢
For tinning both sides, double the above amount.

O'Neill's Patent Planished Copper.—Net 14x18.....\$2 @ 2.1¢
14 and 16 oz. and heavier.....\$2 @ 2.1¢
12 oz. and lighter.....\$2 @ 2.1¢

Boiler Sizes.

7 in., 14x20, 8 in., 14x20, 9 in., 14x20, 14 and 16 oz. and heavier.....\$2 @ 2.1¢
(All sizes less than 30 in. wide.)
24x48 and 30x60.....\$2 @ 2.1¢
14 and 16 oz. and heavier.....\$2 @ 2.1¢
12 oz. and lighter.....\$2 @ 2.1¢

Copper Wire.—(See Wire.)

Sheathing Metal.

Yellow Sheathing Metal.....\$2 @ 2.1¢

BRASS AND GERMAN SILVER.

Brown & Sharps' Gauge the Standard for Metal; Old English Gauge the Standard for Wire.

Brass Manufacturers' Price List, January 17, 1884.....\$2 @ 2.1¢
Old Lead, 2¢ lb.
Duty: Pipe and Sheet, 2¢ lb.

LEAD.—Duty: Pig, 2¢ lb.; Old Lead, 2¢ lb.

American.....\$2 @ 2.1¢
Ordinary.....\$2 @ 2.1¢
Pipe.....\$2 @ 2.1¢

Block Tin Pipe.....\$2 @ 2.1¢
Tin Lined Pipe.....\$2 @ 2.1¢
Sheet.....\$2 @ 2.1¢
Shot.....\$2 @ 2.1¢
Chilled Shot.....\$2 @ 2.1¢
ANTIMONY.....\$2 @ 2.1¢
Hallett's.....\$2 @ 2.1¢
Cookson.....\$2 @ 2.1¢
SPELTER—Duty: Pig, Bars and Plates, \$1.50 @ 1.60 lb.

ZINC.—Duty: Pig or Block, \$1.50 @ 1.60 lb.

American, cash.....\$2 @ 2.1¢
Bergenport.....\$2 @ 2.1¢
Zinc—Open.....\$2 @ 2.1¢
Zinc Tubing.....\$2 @ 2.1¢

Zinc Tubing.—Dis. 25¢.

Plain.....\$2 @ 2.1¢
Fancy.....\$2 @ 2.1¢
Scotch and Extra Patterns.....\$2 @ 2.1¢

SABBITT METAL.

N. P. U.....\$2 @ 2.1¢
X.....\$2 @ 2.1¢
J.....\$2 @ 2.1¢

WIRE.

Market Wire.—Put up in 63 lb. bundles.

Nos. 00 to 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 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1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1270, 1271, 1272, 1273, 1274, 1275

INDUSTRIAL ITEMS.

NEW HAMPSHIRE.

The nut and bolt factory owned by Lafayette Hall and located on the Lee road, about 1 mile from Newmarket Village, was totally destroyed by fire on September 19. Loss, \$22,000; insurance, \$14,000. This is the third time this factory has been burned.

MASSACHUSETTS.

The axe business at East Douglass shows steady improvement in all its departments. The Lovett polishing and grinding shops, which were shut down last winter during the dull season, have been started up again, and, like the forging, tempering and other departments, are being taxed to their full capacity. The indications for a brisk fall and winter season are very encouraging.

John C. Smith, machinist, shipped 30 tons of mining machinery to Fresnillo, Mex., September 15, says the *Holyoke Transcript*. This is the largest single shipment that Mr. Smith has ever made.

The Holyoke Machine Company's shop, Holyoke, is now running full time, and within a few weeks many new men have been put to work, including several molders.

The H. B. Smith Company, Westfield, are about to build an addition to their new foundry over the river, because more room is necessary for their fast-growing business.

The tack works at East Taunton are running full time on heavy orders.

CONNECTICUT.

The shear shop at Norwalk is crowded with orders and is running nights.

The Northfield Knife Company, Northfield, began running full time—10 hours per day—on the 17th ult. For nearly two years eight and eight and a half hours have been their limit.

PENNSYLVANIA.

The Keystone Forge of Craig & Snell, Reading, will start up this week, after a stoppage of over two years. The product will be taken by the Reading Iron Works. Preparations are now making for the resumption of operations.

The new Mammoth Coke Works of J. W. Moore, in the Pleasant Unity district, will be completed this week. The plant comprises 400 ovens and 1½ miles of siding.

The three blast furnaces of the Pottsville Iron and Steel Company, idle for some months, are preparing to resume. No. 1 Furnace, just entirely rebuilt, has been blown in and the others will soon follow.

All the departments of the Pennsylvania Steel Works were in operation last week, with the exception of the merchant mill, which was compelled to remain idle, owing to the repairs not being completed. It is in operation this week.

During the first of last week a roll at Bailey's large plate mill, Harrisburg, broke, and as a result work upon it was suspended for several days in order to make repairs. This roll was placed in position in 1873, since which time there were 55,000 tons of boiler iron rolled by it. The average work of the roll per year has been 7855 tons.

The first Bessemer converter in the Schuylkill Valley was started on September 21, by the E. & G. Brooke Iron Company, of Birdsboro. The metal was run direct from No. 2 blast furnace into the converter, and, after blowing, run into molds, the size of ordinary nail-plate slabs, and taken at once to the nail-plate rolls without going through the ordinary process of blooming. The converter is of 1-ton capacity, and at each blow makes 15 nail-slab ingots. It is a tipping converter, with the tuyeres blowing at the sides of the vessel. When the whole plant is completed there will be two vessels, with suitable cranes and appliances, making a handsome addition to the improvements now going on in this valley. This one vessel, which will remain as a permanent part of the plant, is in use now to test the two practical points of running metal direct from a blast furnace and to roll nail plate direct from small ingots, which was successfully accomplished. The plant was designed by J. C. Dods, of Danville, and the converter constructed by the Scott Foundry, of Reading.

The lining of Stewart Iron Company's No. 1 Furnace, at Sharon, fell in last week, and No. 2 has been blown in to keep up the supply.

Pennsylvania Furnace is booming and shipped 700 tons of iron last month. The iron is of a superior quality, and 30 tons are produced daily. Mr. John Fleming, the founder, has had long experience in running furnaces, and Pennsylvania Furnace owes its success to his management.

The repairs on the Spearman Furnace, at Sharpsville, are progressing quite rapidly, and the plant will soon be ready for operation.

The Hollidaysburg Iron and Nail Company have received such heavy orders that they yesterday notified their employees to work day and night in order that they might be able to fill their orders promptly.

The Harrison Safety Boiler Company, of Philadelphia, are doing a good business. The Nicholson File Company, of Providence, R. I., have just started a battery of 250 horse-power of Harrison "Safety" boilers, and the Barnard Mfg. Co., of Fall River, Mass., who put in 200 horse-power of these boilers about a year ago, are now adding 600 horse-power of the same kind to replace 24 old boilers.

Alexander Bros., Philadelphia, have lately shipped to the McCullough Iron Company a 36-inch four-ply leather belt, 156 feet long, weighing 1911 pounds. This belt drives sheet-iron rolls. The same firm have recently furnished the Gantier Steel Department, of Gambia Iron Company, a 48-inch three-ply leather belt, weighing 1468 pounds. This belt drives from a Porter-Allen engine, and travels 6250 feet per minute.

OHIO.

The Cleveland Rolling Mill Company issued last Thursday a notice agreeing to pay June wages in all departments. Upon this the men, after considerable discussion, agreed to

resume work, and the mills will start up this week.

Mary Furnace, at Lowellville, which was blown in recently, is doing well.

ILLINOIS.

Sixty-one men are employed in the Marine Engine Works, Chicago. There is being built at those works a Bullock printing press for the Providence (R. I.) *Telegram*, together with a large amount of experimental work.

H. B. Seutt & Co., of Joliet, are replacing all their old barbed-wire machines with new improved machines, each of which is capable of producing 6000 pounds of barbed wire every 10 hours. These machines will cost from \$10,000 to \$15,000.

The works of the Northwestern Screw Company, Chicago, have changed hands. C. H. Gurney, of the firm of C. H. Gurney & Co., becomes president, having acquired the controlling interest. The works are running full time.

Thomas Kirkwood, of Chicago, is again increasing his facilities for manufacturing, recent orders for the Kirkwood shaking and dumping grate bar having exceeded his capacity for producing.

INDIANA.

The Ohio Falls Iron Works, at New Albany, are running full time, with a prospect of keeping it up this fall and winter.

The force of men at the New Albany Rail Mill are still working night and day making the conduits for the new St. Louis cable road. The conduits are made of steel rails bent to shape, instead of cast iron, and the machine for bending the rails is original with the company, having cost them \$15,000.

WISCONSIN.

The Lake City Tool Company, of Madison, have increased their capital stock from \$20,000 to \$50,000, and are erecting shops of the following dimensions: Machine shop, 44 x 96; foundry, 40 x 70; boiler and engine house, 30 x 30; wood-working shop, 44 x 96; blacksmith shop, 25 x 40, and paint shop, 30 x 60, all but the last-mentioned to be of stone. The new duplex geared windmills, of which this company make a specialty, are meeting with a very gratifying sale.

MISSOURI.

The St. Louis Bolt and Iron Company have equipped a plant alongside of their works in East St. Louis for the manufacture of nuts, with special reference to the production of track bolts and bridge nuts. The factory is established in a building by itself, with dimensions of 60 x 80 feet, and is provided with a separate engine and other machinery complete. Six machines, already in position, will be used, and some 30 or more hands will be given employment.

On the 24th inst. the United States Circuit Court at St. Louis appointed M. J. Sheridan, of Chicago, receiver of the McKenny Tubular Rail Company, pending a

decree for foreclosure and sale. The rolling mill is in La Grange, and has been idle for several years.

"C" Furnace, which the lessees of the Vulcan Works have blown in, made 80 tons of iron on Wednesday of last week, but the daily output has probably been increased considerably by this time. In regard to the rest of the plant the lessees propose to make thorough preparations before starting up, which, however, does not imply a far-removed resumption of operations.

The Sligo Furnace Company, with plant in Dent County, will stop operations, it is supposed, on or about the 1st of this month, as their present supply of charcoal will have been exhausted by that time.

The Western Rolling Mills, East St. Louis, are running steadily on orders for shafting and forgings generally.

VIRGINIA.

The Shenandoah Iron Company, at Milnes, have defaulted on the payment of some of their indebtedness, and a bill has been filed in the United States Circuit Court there, asking for an injunction and a receiver. The parties to this action are the Seventh National Bank, the Union Trust, Safe Deposit and Insurance Company, the Eighth National Bank, and John Milnes, all of Philadelphia, Pa. The liabilities of the company are about \$900,000, \$500,000 of which is in first mortgage bonds. The remainder is floating indebtedness. The injunction and receiver are asked for by the creditors representing the floating debt.

WEST VIRGINIA.

Huntington parties are in negotiation with C. P. Huntington, of New York, as a result of which a steel nail works will be erected at Huntington.

ALABAMA.

The company which is to establish the Birmingham Chain Works has been organized with B. F. Roder, of Birmingham, president; Peter A. Buyck, of Wetumpka, secretary and treasurer; and Oliver Weiser, late of York, Pa., superintendent. It is expected that the works will be in operation in 60 days.

The City Council of Talladega has granted a water works franchise, with a contract to supply the city, to G. P. Anderton, superintendent of the Birmingham Iron Works. The whole plant will be made in Birmingham. The Nashville and Chattanooga Railroad management is having a route surveyed for the proposed Nashville and North Alabama Road, from Elora, Tenn., to Huntsville.

The towns southeast of Montgomery are bidding in various ways for the Montgomery Southern Railroad, which, it seems, will really be built.

A contract has been accepted at Anniston, to furnish the Citico Furnace, at Chattanooga, 20 carloads of iron ore a day.

Mr. A. Strassburger, of Montgomery has been appointed Alabama Commissioner to

the North, Central and South American Exposition, at New Orleans, and Special Commissioner for the adjacent States. He is now at work arranging for exhibits of the industries of his State.

Scandia Phosphor-Tin.

Messrs. Lewander & Co., of 12 Post Office Square, Boston, as general agents, call the attention of the metal trade to the Scandia phosphor-tin, an alloy to be used in producing phosphor-bronze by melting together copper with it. Two principal grades are made, one containing 5 per cent. and the other 10 per cent. They recommend the following proportions when using 5 per cent. Scandia phosphor-tin:

	Copper—Per cent.	Scandia phosphor-tin—Per cent.	Castings—Per cent.
No. 1. For toothed wheels, nails, wire, bolts, pinions, clock-wheels, couplings...	95	5	
No. 2. For valves, steam-cocks, linings of eccentrics, glands, pump cylinders and other fittings...	90	5	5
No. 3. Common bearing metals, wagon axles and engine bearings...	88 to 86	12 to 14	
No. 4. Heavy bearing, locomotive main driving axles and propellers for steamers...	84 to 82	16 to 18	
No. 5. For long bearings...	80	20	
No. 6. Pump cylinders, eccentrics, light bearings and general purposes...	90	10	

They state that, in cases where economical reasons do not allow the application of phosphor-bronze, the latter will be greatly improved by substituting one-tenth part of the tin by Scandia phosphor-tin (5 per cent.), this bringing a sufficient quantity of phosphorus into the bronze for deoxidizing the metal oxides, and the slight excess in price will be fully balanced by obtaining a dense and sound metal free from bubbles and better suitable for polishing. When remelting old bronzes or old copper, a small portion of Scandia phosphor-tin (5 per cent.) makes a good, dense phosphor-bronze. When tinning iron-work, they recommend the use of an alloy of 90 parts common tin and 10 parts Scandia phosphor-tin (5 per cent.), which makes the tin coating more adhesive, covering quicker and better, and producing a more durable and neat tinning surface. The melting point of Scandia phosphor-tin is from 752° to 932° F.

HARDWARE NOVELTIES.

Leavitt's Improved Screw-Driver.

The accompanying illustration is to show the manner in which the Screw-Driver named above, manufactured by the New England



Leavitt's Improved Screw-Driver.

Specialty Company, North Easton, Mass., is constructed. It is intended to obviate the frequent trouble with screw-drivers on account of the handles working loose and coming off. To prevent this the tang which enters the handle is made flat and barbed or notched, as indicated in the cut. The manufacturers call attention to this device as rendering it impossible to pull the handle off without tearing away portions of the wood, while it costs no more to manufacture than the ordinary style. These screw-drivers are made in sizes from 1½ to 12 inches.

The Blanchard Ash-Sifter.

Porter Blanchard & Sons, Concord, N. H., are offering to the trade the Blanchard Ash-Sifter, a general view of which is shown in the cut. The peculiar feature of this sifter is that it has no crank, shaking-rod or other moving part, the ashes separating themselves



The Blanchard Ash-Sifter.

in falling through the sifter. The principle of its operation is that the coal and ashes, being thrown in at the top, fall upon a series of diagonal grates and shutes and are separated automatically into the two drawers at the bottom of the sifter, the cinders falling into the one and the ashes into the other. Besides the advantage of saving labor, the manufacturers refer to the simplicity of its construction as making this sifter especially durable, as there are no moving parts to get out of order, and that it is operated without dust and requires no skill. Possessing these points of merit the manufacturer put it on the market with confidence. The sifter is 3 feet high, and is well finished with two

coats of paint. It is made in two sizes, one for stove and the other for furnace coal, retailing respectively at \$5 and \$7.

Nason's Foot-Rail Brackets and Corner Fittings.

The Nason Mfg. Co., 71 Beekman street, New York, are offering to the trade a Foot-Rail Bracket for barrooms, shown in the ac-



Fig. 1.—Foot-Rail Bracket.

companying illustrations. It has been their aim in designing the Griffin foot-rail bracket to produce an article artistic in design and fitted in form so as to bear the heaviest strain with the least possible chance of disarrangement, while at the same time it is very light. In describing the bracket the



Fig. 2.—Corner Fitting, Showing Design in Detail.

manufacturers refer to the difficulty of fastening a foot rail to the bar itself, and show that with the Griffin bracket this difficulty is overcome, as the support comes from the floor, and is directly under the line of the heaviest strain, whereas, in the other case, the foot-rest itself acts as a lever to loosen



Fig. 3.—End Finish for Pipe.

its own support. It is mentioned in the circular that when rails with the old form of bracket are in place and in use the latter can be removed and substituted with the Griffin pattern without discarding the rail. These goods are manufactured in plain or galvanized iron, bronze and brass.

The "Novelty" Pocket Knife.

The illustration given below represents a Knife which is manufactured for the patentees by the Empire Knife Company, West Winsted, Conn., the peculiarity of which is that the blade slides in and out of the handle instead of opening in the regular way. A pull of the thumb in the ordinary position in which the knife is held for use upon the thumb-piece opens the

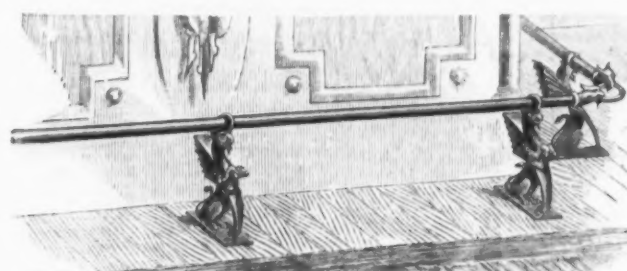


Fig. 4.—Bracket Set up with Rail.

blade slot and permits the blade to drop out, when it is locked in place. The blade can also be set at various distances for use as an eraser, pencil sharpener, nail cleaner, &c., in which position it is held by the pressure of the spring thumb-catch. By reversing the movement of opening the blade drops back into the handle, and the blade slot is then securely closed against the entrance of dirt by the lip of the thumb-catch, which closes over and covers it. The frame of the knife is described as made of extra-hard brass casting, the sides of ebony, and the blade of the best English steel. The length of the knife when opened is 5½ inches.



The "Novelty" Pocket Knife.

The manufacturers call attention to the utility of this knife and the convenience of having a knife operated entirely with one hand. A further advantage mentioned is that extra blades are furnished if desired, and can be easily inserted by any one. It is intended to retail at 50 cents.

The Geographical Society of Hamburg has published a memorandum showing the territorial extent of the recent German annexations in the Pacific Ocean. "It is necessary," says the *London Times*, "to bear in mind that

the German geographical square mile is 16 times as large as the geographical square mile of English geographers. Hence the German estimates will all have to be multiplied by 16 to reduce them to our measurements." Kaiser Wilhelm's Land (German New Guinea), 3225.5 German geographical square miles; New Ireland, 212.3 square miles; New Britain, 584.3 square miles; the Bismarck Archipelago, 947.6 square miles—in all, 4094.5 German geographical square miles, equal to about 65,512 of our ordinary geographical square miles. The same authority estimates the area of New Guinea taken under British protection at 4094.86 German geographical square miles, or almost the same as the total of the German annexations in the Pacific.

Statute of Limitation.

A correspondent in Iowa sends us the following:

"Will you kindly answer the following questions on a point in law and oblige a reader: A and B are in business in Ohio and fail. A remains, while B removes from the State. Do accounts and notes become outlawed after the limitation, just the same as though both had remained in the State? If D fails in Iowa, where the limitation on open accounts is five years, and notes 10 years, and D remains in the State until all notes and accounts are due, after which he removes from the State and remains 12 years, are all accounts and notes outlawed on his return, or can judgment be taken the same as if he had removed from the State before this indebtedness was due?"

The first question propounded by our correspondent resolves itself into the inquiry whether the presence of one of two partners in the State of Ohio, and the absence of the other during the period of limitation, would have the effect of outlawing accounts and notes held by creditors of the firm. In reply it may be said that a debt due from a partnership is known in law as a joint and several debt. By this is meant that both partners are responsible for its payment jointly, and at the same time each partner is liable for the whole amount individually. If one partner is insolvent, the other must pay the firm debts in full from his private resources where the firm property is insufficient for that purpose.

The creditor, therefore, is fully protected, so far as the law is concerned, since he can sue either partner, or both of them. In the case before us A remains in the State, and the creditor has the opportunity of suing him and recovering a judgment. If he neglects to do so during the period of limitation, the debt becomes outlawed against A, and his individual or several liability is at an end. B, however, having removed from the State, has put himself out of the jurisdiction of the courts, so that the creditor has no opportunity of suing him. The accounts or notes, therefore, do not become outlawed against him until he returns and resides in the State for the period of time necessary under the statute to bar the debt. His individual or several liability, of which we spoke above, continues, just as in the case of a private debt. B can therefore be sued for the debt on his return to Ohio.

The answer to the second question proposed is involved in the principles we have just stated. The reason why the absence of a debtor from the State causes the extension of the period of limitation lies in the fact that the creditor is unable to sue him and recover the debt during such absence. It makes no difference whether the creditor leaves before the debt is due or not. It is true that the creditor might have sued him at once on the maturity of the debt, but he is not obliged to do so; he has a right to rely on the promise of the law that he shall

have the legal period of limitation. The debtor cannot abridge that period by remaining until his debts are due and then removing to another State. The logical outcome of such a rule would be to make it possible to shorten a period of five or ten years into a single day. So far is this from being the case that where a debtor has left the State and afterward returned, and has again removed and returned again, &c., the periods of time passed in the State by the debtor on the occasion of these various returns are added together, and the debt is not outlawed until they aggregate the number of years allowed by the law. This is true not only in Iowa, but, so far as we know, is the rule of law in all the States.

It is possible that our correspondent has confused the law as to the absence of the creditor with the rules applicable to the absence of the debtor. If the creditor leaves the State before the debt becomes due, the period of limitation does not commence until he returns; while if he leaves after the debt becomes due, the period continues to run during his absence, just as if he were still in the State. A full discussion of this subject will be found in *The Iron Age* of April 2, 1885, under the title, "Outlawed Debts and Accounts."

France is going to introduce nickel for coinage for 5, 10 and 20 centime pieces. The first issue is to be 7,000,000 francs.

Imports and Exports.

IMPORTS.

The following were the Imports of Hardware, Iron, Steel and Metals into the Port of New York for the week ending Sept. 30, 1885:

Hardware.	Quant.	Value.
Alexandre F. & Sons, Iron nails, cs., 4		
Machinery, pcs., 3		
Berbecquer J., Nails, cs., 15		
Baker Hermann & Co., Hdwr., cutlery and guns, pkgs., 244		
Brown W. A. & Co., Packages, 24		
Buchanan & Lrall, Machinery, cs., 2		
Curley J. J. & Bro., Cutlery, cs., 9		
Dieckhoff, Radfior & Co., Cases, 3		
Drexel, Morgan & Co., Arms, cs., 15		
Dupargner & Huor, Cases, 8		
Ely & Wray, Cask, 1		
Field Alfred & Co., Arms, cs., 17,045		
Anvils, 25		
Chains, cask, 1		
Cases, 5		
Folsom H. & D., Arms, cs., 8		
Fraser P. A. & Co., Case, 1		
Hart A. H. & Co., Machinery, pkgs., 24		
Kuile J. Ter, Case, 1		
Lackawanna Line, Arms, cs., 11		
Laurencot J. B., Cases, 3		
Lipps, Machines, cs., 2		
Markt & Co., Sundries, pkgs., 4		
Cases, 46		
MacBurnie & Wilson, Arms, cs., 3		
McCoy & Sanders, Chains, cs., 4		
Cases, 4		
Merch. Disp. Co., Arms, cs., 6		
Moore's Sons J. P., Arms, cs., 30		
Moseman C. M. & Bro., Cases, 1		
Newton & Shipman, Files, cs., 2		
Files, case, 1		
News Wm., Machinery, bxs., 4		
Noyes, Smith & Co., Cases, 3		
Nudir C. W., Cut saw, box, 1		
Randel, Baremore & Co., Polishers' tools, cs., 9		
Rotterdam S. S. Co., Arms, cs., 30		
Struller, Lau & Co., Arms, cs., 6		
Schwab & Co., Bundles, 392		
Packages, 2		
Schoverling, Daly & Gales, Arms, cs., 96		
Mdse., cs., 12		
Schmitts W. E. & Son, Cases, 12		
Stevens F. E., Jewsharps, case 1		
Steinworth W., Iron pots, 42		
Thurnauer G. M., Hdwr. and glass, cs., 8		
Vom Cleff & Co., Hdse., cs., 13		
Ward Aslines, Mdse., cs., 4		
Watson, Sumner & Co., Mach'y, pkgs., and pcs., 22		
Wiebhauch, Hilger & Co., Arms, cs., 7		
Cutlery and hdwr., cs., 5		
Wilson & Belanger, Cases, 23		
Witte John G. & Bro., Cutlery, cs., 4		
Wright Peter & Sons, Machinery, cs., 2		
Order, Anvils, pkgs., 105		
Chains, cs., 29		
Iron ring, 1		
Ironware, cs., 16		
Cases, 6		
Rivets, cs., 17		
Skates, cs., 42		
Guns, cs., 2		
Iron.	Quant.	Value.
Ackerman B. D., Rods, 2		
Alexandre F. & Sons, Iron wire netting, case, 1		
Baltzer & Lichtenstein, Rods, pks., 648		
Baring Bros. & Co., Bars, 13,077		
Nail rods, bbls., 1800		
Bundles, 22		
Wire rods, coils, 496		
Brown Bros. & Co., Rivet wire, bbls., 917		
Wire rods, coils, 1626		
Charcoal iron, coils, 737		
Bureau of Ordnance, Forgings, 5		
Coddington T. B. & Co., Sheets, bbls., 307		

The importations of Cutlery, Hardware and Metals at this port during the week ended September 25 were as follows:

Quantity.	Value.
Brass goods.....	36 2,301
Bronzes.....	47 4,306
Clocks.....	73 6,777
Cutlery.....	63 22,055
Guns.....	87 15,974
Hardware.....	74 4,494
Iron, pig, tons.....	1,827 27,936
Iron, sheet, tons.....	286 43,354
Iron ore, tons.....	301 667
Iron, other, tons.....	1,063 26,557
Machinery.....	76 7,128
Metal goods.....	235 31,957
Nails.....	125 75
Needles.....	10 6,061
Nickel.....	4 1,996
Old metal.....	21 1,720
Plated ware.....	108 3,189
Percussion caps.....	4 550
Pins.....	150 4,074
Quicksilver.....	135 6,445
Regulus antimony.....	13 2,116
Saddlery.....	18 2,333
Steel blooms.....	5,538 7,544
Tin boxes.....	5,538 7,544
Tin, 4,547 bbls.; 19, 853,057	173,899
Wire.....	734 8,975
Zinc oxide.....	590 4,120

The comparison for two years since January 1 is as follows:

39 weeks Same of 1885.	Same of 1884.
Cutlery, pkgs.....	3,335 3,969
Hardware, pkgs.....	571 552
Iron, R. R., bars.....	9,422
Lead, pgs.....	33,314 28,360
Steel, pkgs.....	1,622,165 1,398,386
Tin, bxs.....	1,421,186 1,462,826
Tin slabs, b.....	14,332,552 18,354,287

EXPORTS.

The following list embraces the Exports of Hardware, Machinery, Iron, Metals, &c., from the Port of New York, for the week ending September 29, 1885:

Dutch West Indies.	Quant.	Value.
Cutlery, case, 1	\$124	
Nails, kegs, 2	92	
Mf. iron, pkgs., 7	29	
Tinware, case, 1	10	
Hdw., cs., 2	22	
Hamburg.	Quant.	Value.
Lamp goods, 2	214	
Copper, casks, 18	250	
Saw, 1	250	
Clocks, cs., 6	257	
Pumps, pkgs., 2	105	
Tinware, cs., 6	270	
Sew. ma., cs., 1349	23,693	
Hdw., pkgs., 177	3,097	
Ptg. presses, cases, 4	500	
Ag. imp., pkgs., 4	185	
Guns, cs., 2	336	
Stamped ware, case, 1	37	
Bremen.	Quant.	Value.
Ag. imp., pkgs., 50	850	
Sew. ma., cs., 1	53	
Antwerp.	Quant.	Value.
Sew. ma., cs., 85	1,300	
Mf. iron, pkgs., 168	950	
Rifles, cs., 15	300	
Copper, casks, 180	24,200	
Copper wire, bbls., 21	2,438	
Rotterdam.	Quant.	Value.
Ag. imp., pkgs., 13	425	
Water closets, bxs, 12	42	
Copper, casks, 142	3,400	
Hdw., cs., 14	316	
Pumps, pkgs., 5	350	
Liverpool.	Quant.	Value.
Copper, casks, 359	47,145	
Mf. iron, pkgs., 10	451	
Clocks, cs., 281	7,680	
Stereo plates, case, 1	105	
Copper matte, bags, 9950	59,300	
Hdw., pkgs., 145	2,546	
Mach'y, pkgs., 62	4,424	
Saws, cs., 21	663	
C. wheels, pr., 6	347	
Old metal, cs., 15	783	
Iron rolls, bxs, 68	1,530	
Sew. ma., cs., 23	4,444	
Pumps, pkgs., 9	354	
Amsterdam.	Quant.	Value.
Hdw., cs., 23	315	
Hull.	Quant.	Value.
Scales, cs., 3	399	
Sew. ma., cs., 12	213	
Hdw., cs., 20	450	
London.	Quant.	Value.
Hdw., pkgs., 23	403	
Rifles, cs., 4	650	
Clocks, cs., 51	889	
Mf. iron, pkgs., 6	62	
Kitchenware, cs., 11	490	
Tinware, cs., 2	80	
Sew. ma., cs., 133	2,378	
Nails, pkgs., 17	535	
Glasgow.	Quant.	Value.
Clocks, cs., 29	687	
Scales, cs., 13	514	
Hdw., pkgs., 17	156	
Mach'y, pkgs., 52	3,851	
Ag. imp., pkgs., 6	335	
British Possessions in Africa.	Quant.	Value.
Ag. imp., pkgs., 307	7,766	
Mf. iron, pkgs., 304	853	
Hdw., pkgs., 10	107	
R. R. scrapers, pkgs., 13	74	
British Australia.	Quant.	Value.
Hdw., pkgs., 608	72,094	
Cutlery, pkgs., 39	1,144	
Mf. iron, pkgs., 299	8,383	
Ag. guns, cs., 4	134	
Nails, cs., 35	697	
Clocks, pkgs., 72	1,563	
Scales, cs., 29	187	
Wringers, cs., 30	378	
S. rollers, cs., 11	270	
Guns, cs., 4	294	
Saws, cs., 18	1,424	
Mach'y, pkgs., 34	3,076	
Ag. imp., pkgs., 137	1,975	
Cartridges, cs., 6	102	
Pumps, pkgs., 41	216	
Sew. ma., cs., 207	6,333	
Pistols, case, 1	381	
Tinware, cs., 5	42	
British West Indies.	Quant.	Value.
Ag. imp., pkgs., 12	47	
Mf. iron, pkgs., 78	569	
Hdw., pkgs., 12	213	
Tinware, cs., 16	182	
Pumps, pkgs., 1	30	
Newfoundland.	Quant.	Value.
Mach'y, pkgs., 1	1,346	
Hdw., cs., 15	351	
Saw, 1	52	
Mf. iron, pkgs., 30	809	
Wire, case, 1	45	
Musket, cs., 4	113	
Wire cloth, case, 1	40	
Nova Scotia.	Quant.	Value.
Hdw., cs., 30	606	
Per. caps, cs., 2	79	
Plumb. matl., cs., 6	50	
Tinware, cs., 11	275	
Clocks, case, 1	699	
Saws, pkgs., 50	784	
Bell, 1	30	
Mf. iron, pkgs., 40	271	
Cartridge, cs., 1	26	
New Zealand.	Quant.	Value.
Hdw., cs., 116	1,684	
Mach'y, pkgs., 8	326	
Nails, cs., 84	1,897	
Sew. ma., cs., 134	4,756	
Mf. iron, pkgs., 125	4,345	
Pump, pkgs., 7	392	

CONTENTS.

	PAGE.
The Hopson & Chapin Mfg. Co. Illustrated.....	1
The English Commission on the Depression of Trade.....	1
Latest Legal Decisions.....	5
Metallurgical.....	7
English Letter.....	9
The Condition of the Sheffield Steel Industry.....	11
Regan's Metallic Shingle. Illustrated.....	11
Melting and Boiling Points.....	11
Scientific and Technical.....	13
The Manufacture of Steel Castings. Illustrated.....	15
American Institute of Mining Engineers.....	19
Hints on the Use of Glue.....	21
Coke-Making and the Use of Coke in the South.....	21
Alabama Coke.....	21
Belgian Iron and Steel Statistics.....	21
Large Rolls.....	21
Editorial:	
The Railroad Situation and the Iron Trade.....	22
The Industrial Training Schools of Philadelphia.....	22
American Interests in the East.....	22
The Revival in the English Iron Trade.....	22
Eastern Manufacturers and the North Chicago Blast-Furnace Practice.....	22
Theory vs. Practice in the Bessemer Process.....	22
Washington News.....	22
Obituary:	
Dr. Garrett B. Linderman.....	23
Peter Townsend.....	23
An English View of the Condition of Our Iron workers.....	23

The Iron Age Directory.....	25
Trade Report.....	27, 31
The Week.....	33
Current Hardware Prices.....	34
Wholesale Metal Prices.....	35
Industrial Items.....	37
Hardware Novelties:	
Leavitt's Improved Screw-Driver Illustrated.....	37
The Blanchard Ash-Sifter. Illustrated.....	37
Nason's Foot-Rail Brackets and Corner Fittings. Illustrated.....	37
The "Novelty" Pocket Knife. Illustrated.....	37
Statute of Limitation.....	37
Imports and Exports.....	38
Mechanical:	
The Efficiency of Dynamos.....	39
An Ingenious Chimney Climber.....	39
Wais's Patent Squaring and Trimming Shears. Illustrated.....	39
Great Bronze Statues.....	39
Louisville Exposition Notes.....	39
The New Converter at Birdsboro.....	39
The Value of Silicon Pig to the Iron-Founder.....	41
Trade Publications:	
"Hills" Wrought-Iron Castings.....	41
Saw Mills.....	41
Building Material.....	41
Beton Construction.....	41
Bituminous vs. Anthracite Coal.....	42
Copper in Demaraland.....	42
The Wear of Rails in Germany.....	42
Philadelphia and Pittsburgh Hardware and Metal Prices.....	55
Boston Hardware and Metal Prices.....	56

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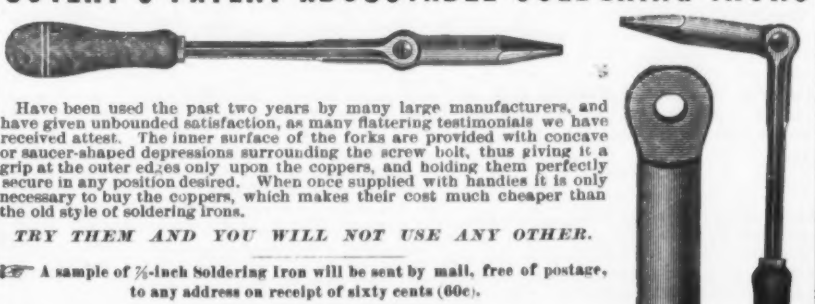
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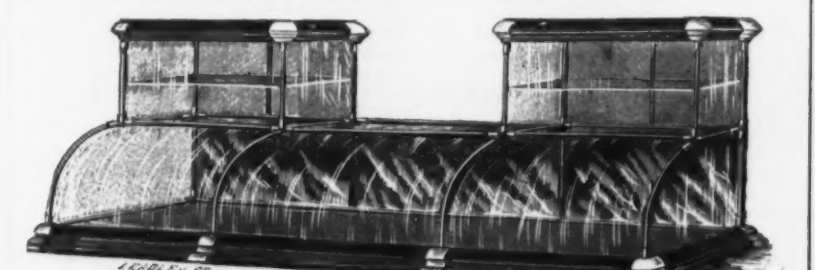
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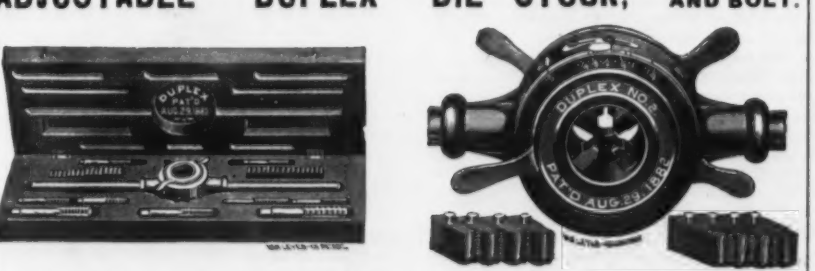


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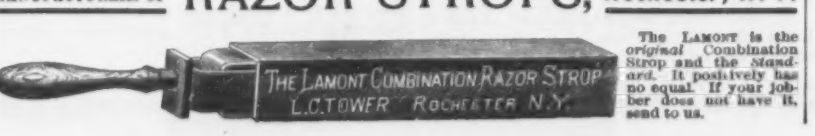
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MECHANICAL.

The Efficiency of Dynamos.

The custom of estimating the excellence of dynamos by their electrical efficiency is now almost universally adopted by the makers of this class of machinery. The process by which the electrical efficiency is computed is extremely simple; in fact, so simple that the validity of the result might almost seem self-evident, and any one daring to doubt the practical value of this method of judging dynamos lays himself open to an attack from those who think that an electrical efficiency of some 90 or 95 per cent. is all that is required to make a dynamo an economical machine. They reason that if a machine converts 95 per cent. of the internal electrical energy into external energy it cannot possibly waste much power, as the efficiency of conversion cannot surely be less than about 90 to 95 per cent., making the total commercial efficiency close upon 90 per cent. Commenting on this, the *Engineer* remarks:

It is precisely this last assumption which deprives the statement of efficiency of its practical value, and to say that the electrical efficiency of a dynamo is 95 per cent. conveys absolutely no idea of the power necessary to work that particular machine. To explain our meaning, let us take the case of a compound dynamo designed for feeding, say 250 60-watt lamps. Without fixing upon any particular type or drawing invidious comparisons between the machines of different makers, we can take it that several such machines could be obtained in the market, at a moment's notice, having all about 90 per cent. electrical efficiency. Some may require less energy for exciting the field magnets, others may have a lower resistance in the armature, but the general result will be in all cases about equally satisfactory. As a fair average we may take it that the armature will have about 0.045 ohm, the main coils 0.015, and the shunt coils 25 ohms resistance. At a speed of 1000 revolutions the external electromotive force would be about 110 volts. These figures are not taken at random, but can be considered as mean values for a number of different commercial dynamos.

The electrical efficiency of our machine is now obtained as follows: Shunt current equals $110 : 25 = 4.4$ amperes; main current, 136; total through armature, 140.4. Hence, loss of electromotive force in armature, $140.4 \times 0.045 = 6.3$ volts; loss in main coils, $136 \times 0.015 = 2.04$ volts; internal electrical energy, $140.4 \times 118.34 = 16,630$ watts; external energy, $110 \times 136 = 15,000$ watts; efficiency, $\frac{15,000}{16,630} = 90$ per cent. Suppose we were to rewind the armature, putting only one-half the number of turns on, but of twice the sectional area, thus reducing the resistance of the armature to 0.01125 ohm, we could then obtain the same electromotive force by doubling the speed. In that case the electrical efficiency of the machine would be nearly 94 per cent. But will the total power necessary to drive it be decreased by 4 per cent? Certainly not. On the contrary, it will absorb a good deal more power, because those hidden causes of loss which can hardly ever be correctly estimated, and which are comprised by the somewhat ambiguous term "efficiency of conversion," have, on account of the doubling of the speed, been enormously increased. We maintain that it is of far greater importance to reduce these losses than to gain a few per cent. more in electrical efficiency. If a dynamo is in full work, there exist a multitude of causes all operating the same way, viz., to absorb power and to create heat. Some of these causes are purely mechanical, as, for instance, the friction of the bearings, the slipping of belts, and the resistance of the air, or windage, as it is called by some electricians. Others are electro-magnetic, and these are the most serious.

In estimating the friction of the bearings, the fact is generally overlooked that it is almost impossible to mount the armature mathematically central within the polar surfaces, and that in consequence the magnetic attraction is not perfectly balanced, throwing an additional pressure upon the bearings and thus increasing the friction. But this is a small matter if compared to the power wasted in some machines by currents in the body of the armature core, and by the reaction which the armature exerts on the polar surfaces of the field magnets. If the number of bars in the commutator were infinitely large there would be no reaction, but as the number is always comparatively small—in fact, seldom more than 100, and generally about 50—the diameter along which the core of the armature is magnetized by the current in its coils is not absolutely fixed in space, but oscillates somewhat to either side of the line of commutation, the number of oscillations per revolution being equal to half the number of bars and their amplitude to their angular distance. The effect on the field magnets is the same as if a powerful magnet were kept rapidly vibrating between the pole pieces. As a necessary consequence local currents are generated in the metal forming the poles, and the metal is thereby heated. This heat has to be paid for by an increased driving-power.

In some cases, especially when the core of the armature is provided with iron teeth projecting between the coils, the reaction we have just described is so strong that it is impossible to take full advantage of these projections by allowing them to approach the polar surface with the least possible amount of clearance. If this were done the pole pieces would become so hot that it would be impossible to work the machine for any length of time, to say nothing of the waste of power. Yet the electrical efficiency of such a machine would be exceptionally high, since on account of the projections of the armature core the magnetic resistance of the field would be very low, and a comparatively small amount of exciting power would suffice to produce a very powerful field. But whether the core be provided with projections or not, a certain amount of heating does always take place, as our readers can easily see by examining a dynamo which has been at work for some hours. It will generally be found that the

iron of the magnets, especially in that part of the polar surface where the armature coils leave it, is hotter than the magnet coils. The reason for this is simply that the maker, with a view to showing a high electrical efficiency, has put sufficient copper into the coils to prevent serious heating, whereas with regard to the magnets no precaution whatever has been taken. One very simple way to minimize the evil is to subdivide the iron of the pole pieces by narrow slots, and we would strongly recommend the adoption of this inexpensive remedy.

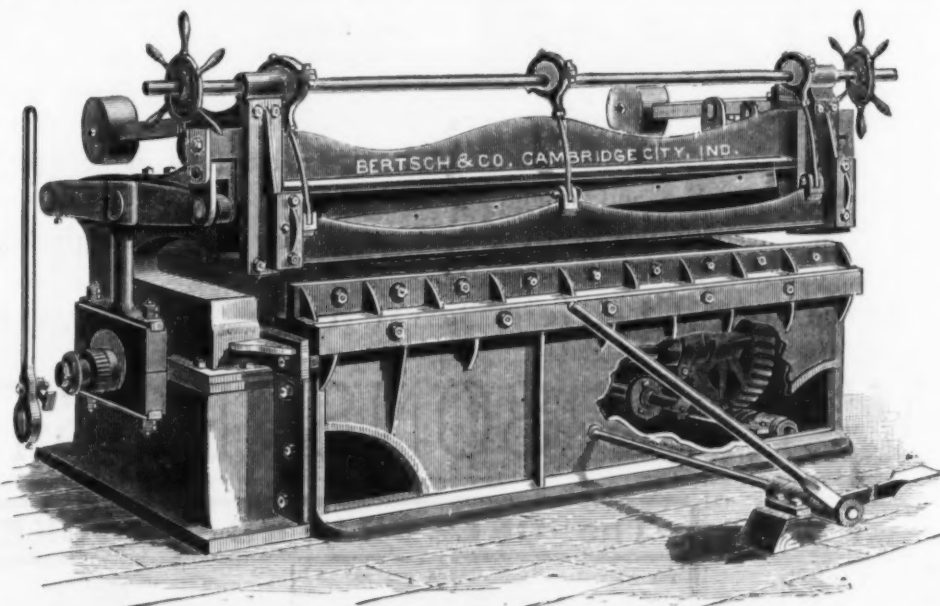
Self-induction in the coils of the armature is another source of heating, and consequently of loss of power. Like the former, it can never be entirely overcome, but by employing a large number of bars in the commutator and a very powerful field it can be considerably reduced. With machines intended for very heavy currents, where the coils on the armature are formed of copper bars, local currents in the mass of each bar are often generated unless the precaution is taken of subdividing each bar into strips. In all these cases the losses increase with the speed, or, to speak more correctly, with the square of the speed, and it is easy to see that in the example we cited above the slight gain of 4 per cent. in the electrical efficiency obtained by doubling the speed is very dearly paid for by the increased losses, the sum total of which is about four times the amount corresponding to the lower speed. What is the actual amount of power wasted in this way can only be determined by careful dynamometer experiments, but, unfortunately, very little has as yet been done in this direction. At South Kensington and elsewhere exhibitions follow each other in close succession, but in no case have any trials been made to settle the question of the efficiency of dynamos from a practical point of view. The small sum necessary for the purpose does not seem yet to be obtained, although public money is used to support these exhibitions, and large sums are made and disposed of somehow.

The introduction of this most misleading conception of electrical efficiency is probably to some extent the reason why the practical

features as the other Wais shears, but is of a larger size than any previously made. The shears shown in the cut is especially adapted for use in rolling mills and in working heavy sheet iron, it being made particularly large and strong for the purpose. It will be noticed that the end of the machine is left open, which allows of the sheet iron being introduced in such a manner that a sheet of any length can be cut. The machine is run by a worm and screw gearing, and, as the power is applied from below, the makers state it is not necessary to build the machine so heavy as where an over-running gear is employed. The eccentric shaft is made of steel, and has a clutch with a shifting lever by which the clutch can be thrown in gear from the front of the machine by foot or lever. The eccentrics are so constructed as to be readily adjusted to compensate for any loss by wear of the blades. The connecting-rods between the eccentric and lever are made of wrought iron. The clamp for holding the sheet iron is operated from the front of the machine by hand-wheels which raise or lower the clamp, as desired. On the rod to which the hand-wheels are fastened are three eccentrics, as shown in the cut. By this means the clamp is adjusted to hold heavy or light iron. The gate is balanced by means of horizontal arms with weights attached. There are two ratchet levers to operate the machine by hand when for any reason it is not advisable or convenient to use power. The No. 6 machine, which is the one illustrated, is capable of cutting $\frac{1}{2}$ -inch iron 5 feet in length at one stroke. Other sizes, cutting up to 10 feet in length, are made. The table is composed of a hardwood frame running on V-shaped rollers, which allows it to slide easily past the shears when the sheets are trimmed. It is also provided with a parallel front and square gauge to insure accuracy in trimming and splitting.

Great Bronze Statues.

The Greeks erected many statues to their divinities, which were in most cases of bronze or covered with plates of gold and ivory. Their most celebrated sculptors



WAIS'S PATENT SQUARING AND TRIMMING SHEARS FOR ROLLING MILL USE.

aspect of this question, which alone is of value to the engineer, has been so much neglected. It is so easy and simple to figure out the electrical efficiency to at least two places of decimals, and to dazzle intending buyers with the astonishingly high coefficient—obtained, let us at once remark, in perfectly good faith—while trials with a dynamometer are costly and troublesome, and would certainly not show such highly-encouraging figures. In saying this we wish to be clearly understood. Nothing is further from our mind than to disparage generally the actual efficiency of dynamos. We have always held that good dynamos are, without exception, the most perfect machines for the transformation of energy; but we maintain that the so-called electrical efficiency is in no way a measure for the economy of transformation; nay, more, that in some cases, especially with high speeds, it is positively misleading.

An Ingenious Chimney Climber.

A new device to facilitate the safe climbing of tall chimneys has been brought out in England. The apparatus consists of two stout timber grippers capable of being secured to the chimney to be climbed by means of two long bolts, one on each side of the chimney; to these upper grippers are suspended by means of four chains two others precisely similar, capable also of being bolted to the chimney, and to the latter is attached the stage. The lower and upper grippers are also connected by means of two steel screws 2 inches in diameter. The operation of climbing the chimney is as follows: Supposing the upper grippers to be screwed fast, and the lower ones to be loose, then the weight of the stage is being sustained by the chains; the two screws are now operated, and the stage is thereby gradually raised; when the desired height is reached the lower grippers are secured by tightening up the bolts, which takes off the weight from the upper ones, so that the latter can now be raised to a greater height by simply working the screws the reverse way; when the chains are again tight the upper grippers are secured as before, the lower ones released and the operation of "lifting" is continued. The apparatus is made by Messrs. Brown & Porter, of Liverpool, and will evidently save a great deal of time lost by the methods of "steeple jacks," besides insuring greater convenience and safety.

Wais's Patent Squaring and Trimming Shears.

Messrs. Bertsch & Co., Cambridge City, Ind., are placing on the market a large size of the Wais patent squaring and trimming shears, which we illustrate in the cut below. This machine embodies the same

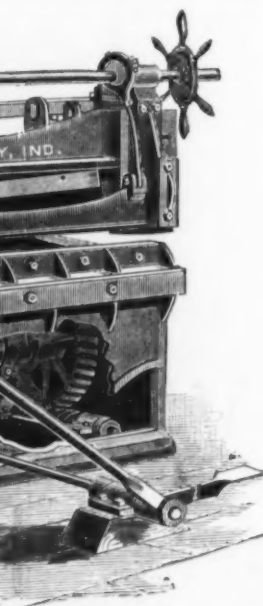
adopted the colossal type. The Minerva of Phidias was 37 feet in height. In reality it was a wooden statue supported by an internal trussing of iron, and covered with golden plates repoussé with the hammer and chased, and with plates of finely-carved ivory. It was so accurately fitted together that it was impossible to detect the joints. The celebrated Jupiter Olympius of the same sculptor was likewise of gold and ivory. The god was represented seated and was 40 feet in height. Phidias also constructed several colossal Minervas, one of which, Athena of Promachos, was 50 or 60 feet in height. The famous Colossus of Rhodes, the work of Chares of Lindus, was erected 300 years before Christ, in honor of Apollo. It was of bronze, and passed for one of the seven wonders of the world. Its feet rested upon the two moles which formed the entrance to the harbor, and ships passed full sail between its legs. It was 105 feet in height, and everything in equal proportion, and few could clasp around its thumb. It took 12 years to make it. A winding staircase ran to the top, from which could easily be discerned the shores of Syria and the ships that sailed on the coast of Egypt, by the help of glasses which were hung on the statue's neck. Notwithstanding that it was ballasted with stones to secure stability, it was partly destroyed by an earthquake, B. C. 224. Its remains are said to have been sold A. D. 672 by the Saracens, who were masters of the island, to a Jewish merchant of Edessa, who loaded 900 camels with the metal, whose value had been estimated at what would be represented in United States money by \$150,000.

Rome, especially under the Empire, erected many colossal bronze statues, representing in most cases Caesars that had been deified even when living. That of Nero by Zenodorus was 110 feet in height. In Japan there is a brass statue of Buddha, represented seated, which is 50 feet in height. In India and China most of the gigantic idols are of masonry or of roughly-carved wood. In the Middle Ages there were the Saint Christophers that were erected at the entrances to many churches, and the great statues of Roland. In modern times colossal statues have generally been constructed only when the distance from the point of view rendered it necessary to increase the proportions. Several celebrated artists have often felt the need of joining material grandeur to that of expression. In the first rank of these stands Michael Angelo, of whose works we shall cite only his bronze statue of Julius II, three times the size of life.

Almost all the most recent colossal statues have been cast in bronze. We may cite the following: The equestrian statue of Peter

the Great, by Falconet (1766), at St. Petersburg. The figure of the Czar is 12 feet and the horse 18 feet in height. The entire group weighs 39,600 pounds. The statue of Bavaria, inaugurated in 1850, near Zurich. This is 52 feet in height and weighs 1560 cwt. The plaster model was divided into 15 pieces for molding in bronze, and this latter operation took about six years. The Virgin of De Puy, a work of the sculptor Bonassieux, inaugurated in 1860. The height of this is 52 feet and its weight 220,000 pounds.

Finally, the colossal statue of Arminius, inaugurated in 1875, upon the summit of the Grotenburg, near Detmold, Westphalia. The height of this is about 65 feet, not including the sword, which measures nearly 25 feet. The weight of the whole is 237 cwt. The most remarkable example of the use of repoussé work in colossal statuary is certainly the St. Charles Borromeo of the sculptor Cerani, which was erected in 1697, near Arona. In its construction this statue much resembles Bartholdi's Liberty; so it merits particular mention. Its height is 76 feet, or, including the pedestal, 115 feet. The length of the arm is 30 feet, that of the nose 33 inches, and that of the forefinger 6 feet. The statue is of repoussé copper supported, through iron cramps and trussing, by internal masonry which is nearly tangent to the copper shell, and which rises as far as to the neck. The copper plates are but 0.06 inch thick. They did not have to be hammered over patterns, but directly by hand. These plates are quite boldly joined by large rivets 1.6 inches apart. They are connected directly with the masonry by means of eye-bolts and hooks. The right arm, which is nearly horizontal, is supported by a large oak beam, of 14 x 15 inches section, sealed into the masonry, and provided with flat irons, like the yard of a ship. This beam is supported by rods sealed into the masonry. The wood is now rotten and will have to be replaced. The left hand, which holds a book, is supported by three iron rods suspended from a beam that is sealed into the masonry. The statue is entered through an aperture hidden under a fold in the alb, and which is reached by a ladder. The ascent is very difficult.



As regards other recently constructed statues of hammered copper, we hardly need cite any but the one erected at Alise-Sainte-Reine in honor of Vercingetorix, the heroic defender of the Gauls. Its height is 23 feet.

Louisville Exposition Notes.

Our Louisville correspondent sends us the following additional notes of the exposition in that city:

At the solicitation of all the exhibitors, the Board of Directors of the Southern Exposition decided to put the entrance fare at 25 cents, and that of Cappa's band, which is always popular, has increased the attendance to a wonderful degree. This might be a pointer for the other exhibitions now going on. Exhibitors and visitors are all alike pleased, and the move has proved a success.

The Murphy Iron Works, of Detroit, Mich., have on exhibition one of their Murphy smokeless furnaces. They claim that this furnace is not a smoke consumer, but one that makes no smoke. The fuel is fed down by an automatic stoker upon slanting grate-bars, which vibrate slowly, keeping themselves clean and carrying all clinkers down to the rotary clinker crusher and remover. Coal is thrown in through feed doors, and before it reaches the grate-bars hot air cokes it, and the escaping gases are consumed, this being one of the economical points. No smoke at all issues after the fire is once kindled. One of their furnaces is in use at Dennis Long & Co.'s pipe works here, and gives complete satisfaction.

Disston & Sons, of Philadelphia, have a very complete exhibit of their line of goods. Every size and shape in saws is represented, and the circular ones are all in motion, which makes a very attractive appearance. They are all under glass cases, and consequently the tools are kept clear of dust and damp.

A new invention, the Purdy horse-shoe machine, is in daily operation in the southeast corner of the building. This machine was invented by Dr. Z. V. Purdy, of Louisville, veterinary, and his idea was to get a shoe that fitted the natural curves of a horse's hoof. His machine turns out 60 perfect shoes per minute, with nail holes punched. The iron is heated only once, and the machine requires but three men to work it. An Eastern manufacturing house is endeavoring to get control of the patent, and will probably do so, as they have the option at a certain price.

A diminutive steam engine is exhibited by Messrs. Irion & Girardet, of Louisville. A complete boiler and engine, which is worked

by the breath conveyed into the boiler through a rubber tube, is made of 1 pennyweight of nickel and $\frac{1}{4}$ pennyweight of steel. It is composed of 137 pieces, with 47 screws to put it together. Stroke, $\frac{1}{4}$ inch. Value, \$500. This is said to be the smallest engine in the world, and works beautifully.

The Encaustic Tile Company, of Indianapolis, have a beautiful display of tiling for floors, hearths and ornamental work. They have a great many attractive designs. Messrs. Hegan Bros., of Louisville, are agents for Kentucky, who also have the finest exhibit of ornamented and carved wood mantels ever shown here.

P. Bannon, of Louisville, and Canfield & Griffin, of Akron, Ohio, show full lines of terra-cotta sewer-pipe, flues, &c., and some ornamental figures made of fire clay. P. Bannon uses the Hanging Rock clay from Means, Kyle & Co.'s mines.

The New Converter at Birdsboro.

The new converter of the E. & G. Brooke Iron Company, at Birdsboro, Pa., is practically a Clapp-Griffiths converter carried on trunnions. The converter is turned by a small steam engine operating through a worm-wheel. The blast is taken from the blast-furnace engine at about 7 pounds pressure. The vessel is concentric, receiving the metal through the nose while lying on its side, and the metal lies clear of the tuyeres before turning up. After blowing the vessel is turned down on the other side, the metal lying clear of the tuyeres on that side. The manganese is added, and the steel can be poled and allowed to cool a little in the vessel before pouring in the ladle. The converter takes a charge of about 2600 pounds, and has four tuyeres placed horizontally 6 or 7 inches above the bottom, the quality of the steel being identical with that produced by the Clapp-Griffiths process.

A most important fact is that this low-pressure steel lies perfectly quiet in the molds and shows no tendency to rise, even if not stoppered. It is claimed, therefore, that by using suitable casting-boxes any number of small ingots can be poured from the top, making little scrap. The small ingots can go direct to the rolls without being bloomed down from large ingots. This steel acts in the molds like mild crucible steel, and it was never considered necessary to bloom that metal—that is to say, to make ingots of enormously larger size than the finished product, as a 14-inch square ingot to produce a nail. This, it is urged, is an important point when considering a mill whose capacity is some 50 tons a day. Such a mill can use this steel direct, but with a blooming mill whose capacity is naturally much larger, the blooming mill, in addition to its first cost, would run at a disadvantage on account of being idle a considerable portion of the time.

Captain Matthews and Howison, Naval Constructor Much and Chief Engineer Baker have been appointed a board to appraise the work upon and the material used in the construction of the unfinished cruisers Chicago, Boston and Atlanta. Secretary Whitney has sent a letter to the board for their information and guidance. He says that the validity of the contracts has never been assailed, neither has the department questioned the character of the work done on the three ships. "Work having been stopped," he says, "the Government has proceeded under the contracts to take possession and have an inventory and appraisal made, and hereafter will doubtless find it wise to complete the vessels where they lie."

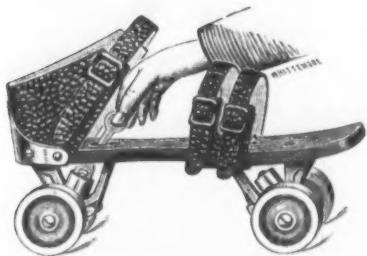
The ex-minister to Japan, John A. Bingham, states the reasons for the failure of the treaty of commerce which he tried to arrange between the United States and Japan seven years ago. When the European powers heard of it, Germany and England sent their gunboats into Japanese waters. Not long after the Japanese Foreign Minister called on Mr. Bingham, with the draft of the treaty he had proposed, but with another clause added, "Providing that this treaty shall not take effect until similar treaties have been entered into with the European powers." Mr. Bingham asked what the meaning of that was, and the minister, pointing to the ironclads in the harbor, said he was afraid to offend the European powers. Seven years have elapsed, and not one of the European powers who then interfered has proposed any such treaty as America and Japan were then asked to wait for.

The Peruvian Government, in consideration of an advance of 500,000 silver dollars, has granted an extension of 50 years to the monopoly enjoyed by the Dock Company of Callao, known as the Muelle Darsena, for loading and discharging all ships coming into Callao Bay. In the new arrangement the burden imposed on vessels are lightened and transferred to the merchandise handled. All goods arriving from abroad are charged 2 silver dollars per ton by the company for handling, and native produce 50 cents per ton. Large warehouses for the storage of goods are to be constructed, and the system of warrants on bonded merchandise will be followed.

Correcting a common impression that iron cotton ties are sold in Europe by Southern exporters at the price of cotton, the *Atlanta Constitution* says: "The English rate is based on the cotton itself, free from all extraneous matter. The American price is dependent on the English one, with a reduction allowed for the weight of the ties; so that if there were no bands, if the cotton were shipped loose to England, its price would be a trifle higher. In the American estimate, it is true, no mention is made of this, but the ties are none the less taken into consideration and allowed for in the fixing of prices."

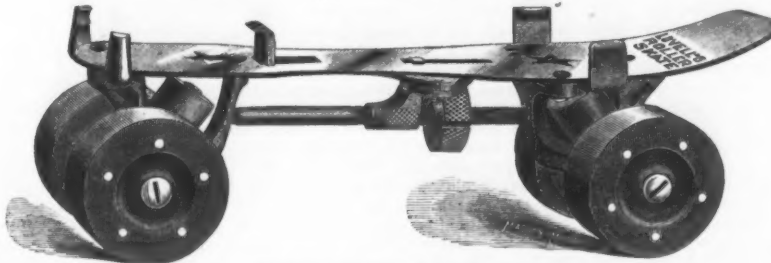
The Canadian Pacific Railroad will soon call for tenders for building the bridge across the St. Lawrence to connect its system with the American railroads at St. John's and Southampton Chamblay. The length of the bridge will be 3000 feet, and the cost about \$1,500,000, including approaches.

Lovell Rink Skate.



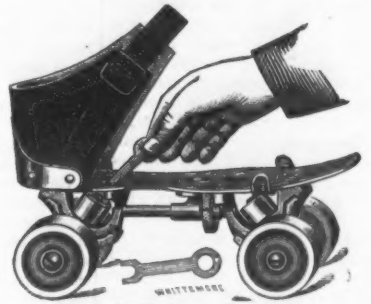
Retail Price, \$3.00.

Lovell Roller, All-Clamp.



Retail Price, \$6.00.

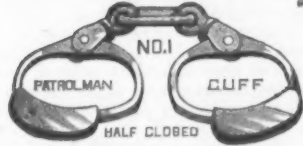
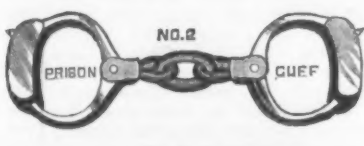
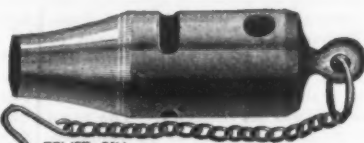
Lovell Half-Clamp Skate.



Retail Price, \$6.00.



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Champion Single Breech-Loading Shot-Gun.

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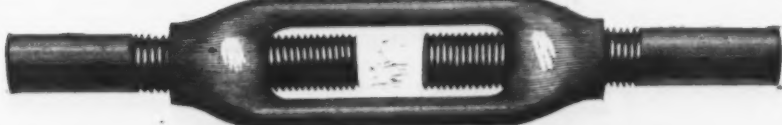
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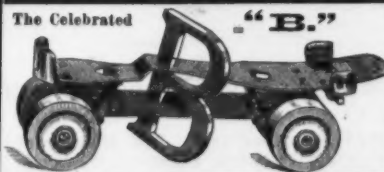
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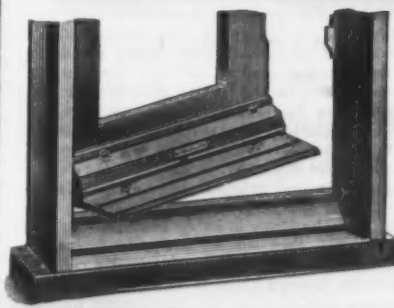
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IRON LEVELS.

* Read before the Glasgow meeting of Iron and Steel Institute.

That an extra quality of "Mitis" wrought-iron castings as strong as and far exceed.

The New York Stone Contracting Company, with offices 113 East 25th street, New York, have issued a very handsome pamphlet of some 70 pages illustrating the applications of beton construction under the Coignet and Goodridge patents. The engraving

ings show systems of constructing and repairing railway and other structures. There are also included among the illustrations the drawings of the United States and Canada patents on which the systems shown are based. The manufacture of beton in this country was commenced as recently as 1869. The company who issue the present work have been prominent in this line of business in the interval, and the illustrations in this book show many structures which they have erected. A number of them have been up for a term of years, and have satisfactorily withstood all the tests to which they have been subjected. The work illustrated includes structures in different parts of the country, among which we notice tunnels for the New York, Ontario and Western Railroad, the celebrated cantilever bridge over the Niagara River, piers for the Kansas City bridge, tunnels under the Pennsylvania Railroad, the Portage bridge of the Erie Railroad, the Bergen tunnel of the same railroad, with work more or less ornamental in and about the parks in Brooklyn and New York.

Bituminous vs. Anthracite Coal.

The Jarvis Engineering Company have made tests in evaporation, made on a steel tubular boiler set with the Jarvis patent furnace, at the Silver Lake Company's mill, at Newtonville, Mass., which represent a day's work using different kinds of fuel. The tests were comparative, all having been made alike; the water and coal were weighed in each test on scales; the fires were started fresh every morning:

Report of Tests.

Date of test... July 21. July 22. July 23.
Duration of test... 11 h. 12 m. 11 h. 11 m. 11 h. 10 m.

Kind of fuel used—
Cumberland 480.
Egg.

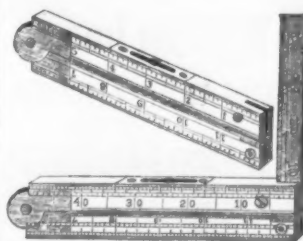
	Egg.	Cumber-land.	Screen-land 1,600.
Total weight of water evaporated, lbs.....	18,000	17,600	17,357
Equivalent evaporation from and at 212°, lbs.....	10,548	10,181	10,067
Total weight of fuel consumed, lbs.....	2,415	1,954	2,080
Total weight of ashes and refuse, lbs.....	479	167	263
Total weight of combustible, lbs.....	1,936	1,787	1,817
Fuel consumed per hour per square foot grate surface, lbs.....	7.84	6.46	6.77
Average temperature of feed-water, deg. F.....	152	152	151
Average pressure of steam, lbs.....	45.68	43.00	44.91
Equivalent consumption per pound of fuel from and at 212°, lbs.....	8.10	9.79	9.07
Water evaporated per pound of fuel under observed condition, lbs.....	7.45	9.00	8.34
Water evaporated per pound of combustible, lbs.....	9.20	9.85	9.55
Equivalent evaporation per pound of combustible from and at 212°, lbs.....	10.10	10.70	10.30
Cost of fuel consumed in time run.....	\$5.38	\$4.45	\$5.58
Pounds of water evaporated per \$1.00 worth of fuel from and at 212°.....	3.636	4.348	5.270
Economy of using screening mixture over egg coal.....			81 %
Economy of using screening mixture over Cumberland coal.....			17.5 %
Cost of fuel per ton, delivered at the mill, including freight, cartage, &c.: Egg coal, per 2,240 pounds.....			\$5.00
Cumberland coal, per 2,240 pounds.....			4.50
Pea and dust coal, per 2,240 pounds.....			8.50

Copper in Demaraland.—In the course of an interesting letter in a Scotch paper on Demaraland and its inhabitants, from Lieut. Siegmund Israel, a member of the German African expedition, some remarks are made regarding the occurrence of copper in that country. It seems that indications of copper abound all through the country, and that the Ovamboes, who are the workers of this metal, point to several localities in the Kaoko Veldt, whence in former times, according to tradition, the ore was brought from which the pure metal was extracted. The Demaras obtain their supplies at present from the Bushmen at Otave, who quarry it out of deposits which exist there of surpassing richness. The reduction of this ore by the Ovamboes is assisted by the use as a flux of the ash of a tree met with in the country. Thirty years ago copper prospecting parties were sent to Demaraland from Cape Colony, but for some reason not yet explained they confined their explorations to the country south of the Swakop River, where, although indications were everywhere met with, no promise of a mine was afforded within a reasonable distance of the coast.

The Wear of Rails in Germany.—A very exhaustive series of statistics on the wear of rails on the railroads of the German Railroad Union, embracing the Dutch, German, Belgian and Austrian roads, shows rather irregular results as to wear of head, ranging from 1 mm. (0.039 inch) for 1,919,000 metric tons carried up to 1 mm. for 22,111,000,000 tons carried. The first result was attained on grades of from 1.7 to 2.5 per cent., and on track with curves as short as 600 feet radius, and the latter with 0.5 per cent. grades and 2° 30' curves. On track with curves of 3° and grades of 0.33 per cent. a wear of 1 mm. per 12,535,000,000 tons was found, and with 0.5 per cent. grades and 6° curves a wear of 1 mm. per 9,481,000,000 tons was found. The result as to wear showed the curious feature that the wear per 1,000,000 tons carried, as a general rule, decreased as the head wore down. This applies not only to straight lines, but also to curves.

An English firm, Messrs. Chubb & Son, have just completed a very powerful steel safe. The walls are formed of compound plates in three layers of hard and mild steel, so that they can be neither fractured nor drilled. The room is entered through three heavy doors and grills 7 feet 2 inches by 3 feet 4 inches and 7 inches thick. They weigh about 30 cwt. each and are hung on hardened steel pins. The bolts shoot out from the edge of the door at opposite angles of 45°, so that any attempt to wedge the door only binds the bolts more tightly in their holes. The safe weighs close upon 100 tons, and is 16 feet in length by 16 feet wide and 10 feet high.

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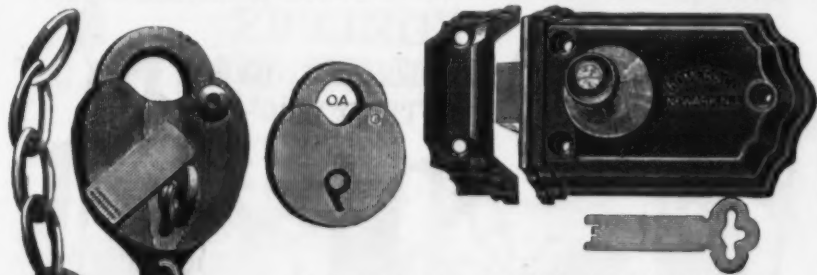
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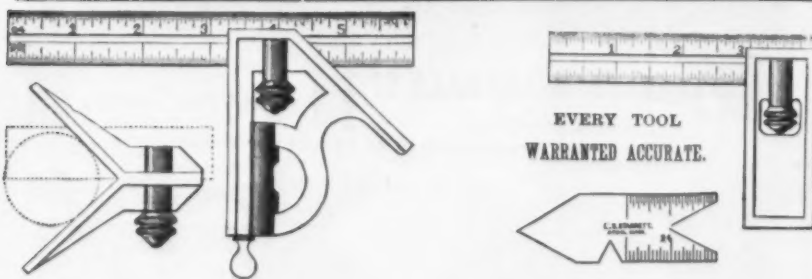


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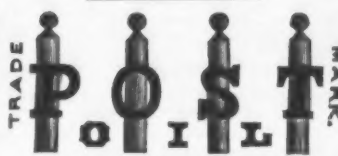
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AND

LEATHER
PRESERVATIVE,

For Wet and Dry Leather
Belting.



Registered in the U. S. and Great
Britain.

THE
STANDARD BELT OIL
OF THE WORLD.

Leather dressed with this oil will not
crack or rot, as heat, cold, water or gas
has no effect on it. It will spread one third
further and last much longer than any oil
for the same purpose. It never turns rancid;
will keep in any climate. Belts may
be run in water at one end and a hot room
at the other, and still be soft, dry and pliable.
Warranted not to start glue-laps or
gum on belts or pulleys, and to keep the
surface perfectly smooth.

Beware of Imitations Sold
at a Cheaper Price, the Color
of which is well calculated to
Deceive.

In their Treatise on Machine Belting,
FAYERWEATHER & LADEW, suc-
cessors to J. B. HOYT & CO., speak of
Post's Oil as follows:

OILING OF BELTS.

"Care should be taken that belts are kept
soft and pliable. For this purpose we de-
cidedly advise the use of POST'S WAT-
ERPROOF BELT OIL AND LEA-
THER PRESERVATIVE. When ap-
plied as directed, it makes the belt smooth,
pliable and adhesive, and causes it to hug
the pulley closely, so that no power is lost
from lack of pulley contact. It possesses
excellent preservative qualities and also
renders the leather more impervious to
dampness than any article or preparation
we know of."
"Moisture should not be allowed to pene-
trate the laps or joints, as it will dissolve
the cement and cause the laps to come
apart."

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If you cannot get POST'S
OIL from your Belt Maker,
send direct to us and we will
see that you do get it.

Price, Per Gallon, \$1.50.

10 gallons, \$15.00 boxing and can, \$1.00.
25 " " 37.50 no charge for 1/2 Bbls.
50 " " 75.00 " " Barrels.

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No. 10 Peck Slip, N. Y.,

SOLE MANUFACTURERS.

THE SMITH & EGGE MFG. CO.,
BRIDGEPORT, CONN.



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Centennial Award. "Superior in Every Respect."
This is one of the best selling locks in the market,
and affords the dealer a large profit. It is thor-
oughly and strongly made—of the best material—
very handsome in appearance, and every Lock is
warranted. Orders solicited.

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is a substitute for cord in hanging weights to windows. It is manufactured by us only, and by auto-
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construction and quality. We have been to great expense in producing a metal having all the qualities
and conditions requisite for making suitable chain for this purpose, and to prevent other chain of the
same pattern of link and of the same general appearance, but made from an inferior metal, being offered
as the same thing, we patented the word "Giant" as a Trade-Mark, as applied to either metal or chain.
Trade-Mark Registered April 16, 1875, and October 22, 1878, and our metal is therefore known in the
market as "Giant Metal," and our chain as "Giant Metal Sash Chain."



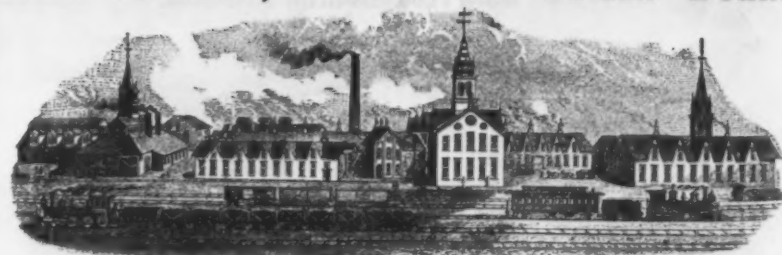
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Manufacturers of
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SUPERIOR

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UNION HARDWARE COMPANY,

TORRINGTON, CONN., U. S. A.

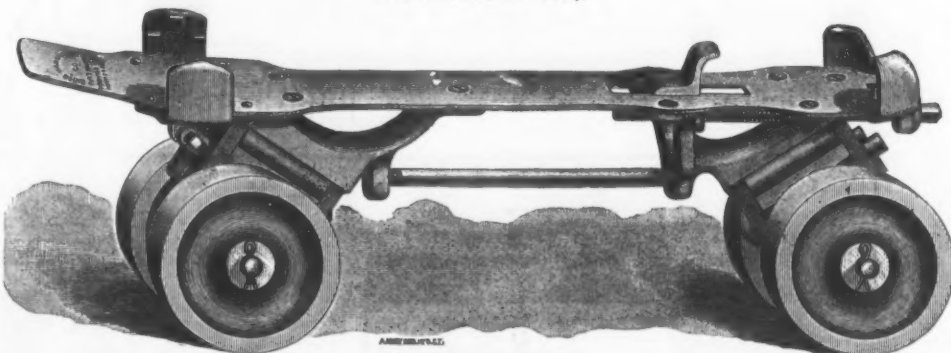
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CLUB SKATES

For Rink and Private Use,

BOTH FOR LADIES AND GENTLEMEN.



MANUFACTURERS OF

The advantage being that they will fit any style of heel, whether large or small, without the use of straps.

82. FROSTED NICKELED

Per Pair, \$5.50.

83. POLISHED NICKELED

Per Pair, \$6.50.

Ice and Roller Skates, and Specialties in Hardware, Wood Turners, and Electro-platers in Gold, Silver, Nickel and Brass.

ESTIMATES FURNISHED FOR WOOD TURNING AND PLATING ON APPLICATION.

HENLEY'S CHALLENGE ROLLER SKATES.

THE LATEST AND BEST!

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SKATES

IN THE MARKET.

Patented Nov. 16, 1880, and Aug. 23, 1881.
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RICHMOND, IND.MENTION *The Iron Age*.THE
Henley Rink Skate.THE
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CLUB SKATE.

THE UNITED BRASS COMPANY,

79 FULTON and 54 GOLD STREETS, NEW YORK,

MANUFACTURERS OF EVERY VARIETY OF

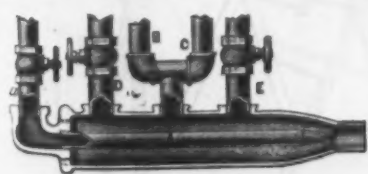
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Will stop all snapping and cracking noises in steam pipes; increases heat in dry rooms. The only fitting in the world that will do it. It is worked by steam after passing through the heaters.

McDANIEL'S PATENT EXHAUST-PIPE HEAD acts as a muffler, preventing noise of exhaust steam, and stops all spattering of water on roofs and pavements.

CHAPMAN'S
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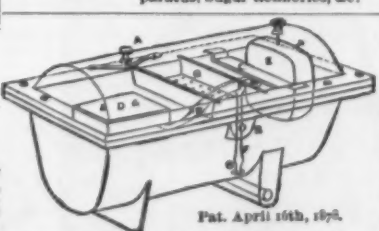
For Heating Apparatus, Dry Rooms, Breweries, Factories, Distilleries, Sugar Houses, Pipes leading to Steam Pumps in Mines, Canning Houses, &c.

All the above sent on trial and satisfaction guaranteed. Sold by the trade generally.

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REGULATOR.

For reducing and giving an even pressure, regardless of pressure on boilers. For Paper Mills, Heating Apparatus, Sugar Refineries, &c.

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CLIPPERS

For Horsemen and Barbers.

Please observe that every
FIRST QUALITY CLIPPER

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Shovels, Spades and Scoops.

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Patent Household Articles.

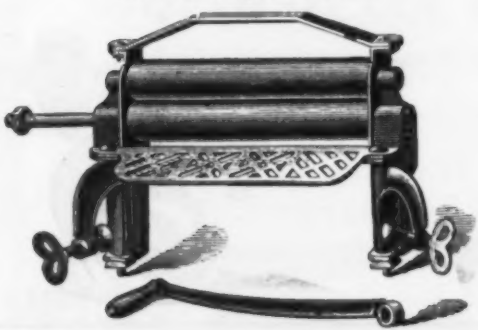
T. P. Burke & Co., NEW YORK and EXPORT AGENTS, 100 Chambers St., N. Y.

SEND FOR ILLUSTRATED
CATALOGUE OF 1885.

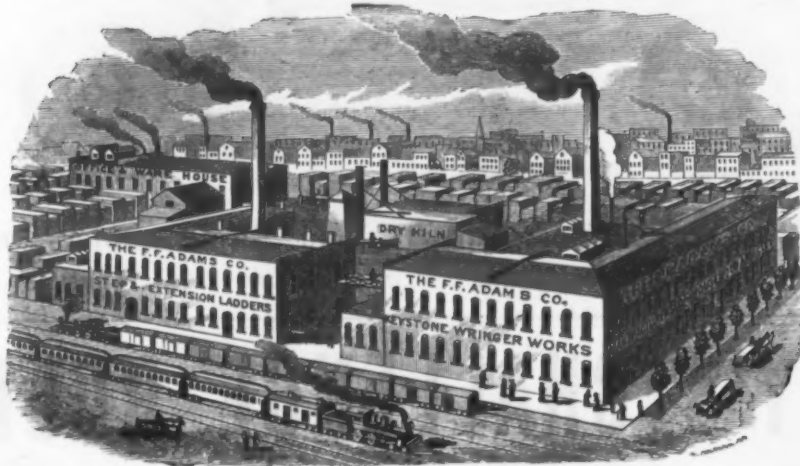
The Celebrated Keystone Wringer.



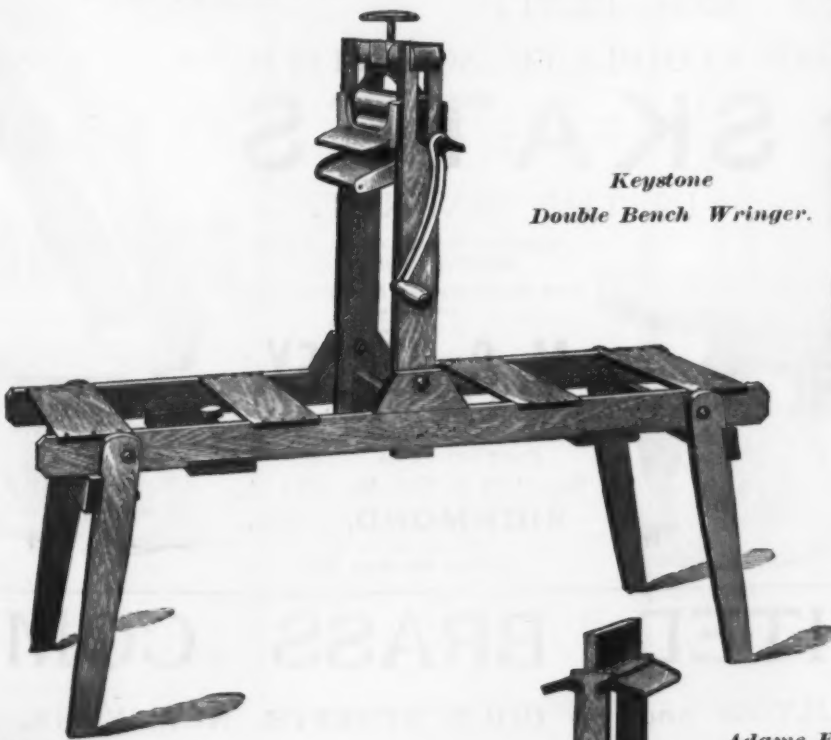
Our New Style No. 11.



Adams' Patent Machine for Drawing Corks.



*Keystone
Double Bench Wringer.*



*Adams Folding
Double Wash Bench.*



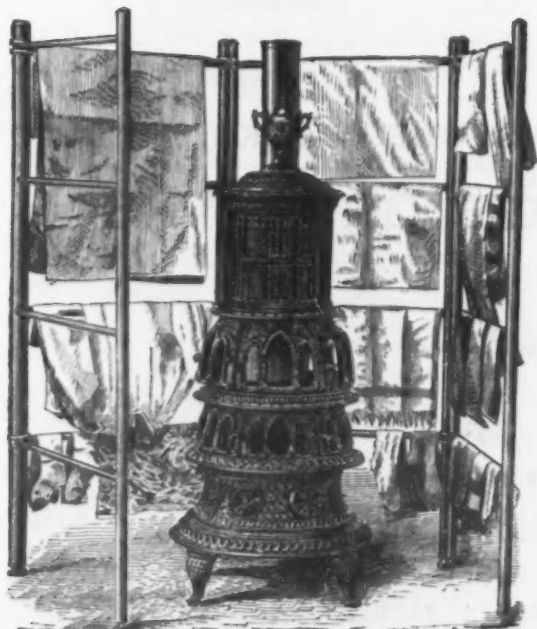
Lovell's Patent Extension Ladder.
Patented October 22, 1867, and August 4, 1874.



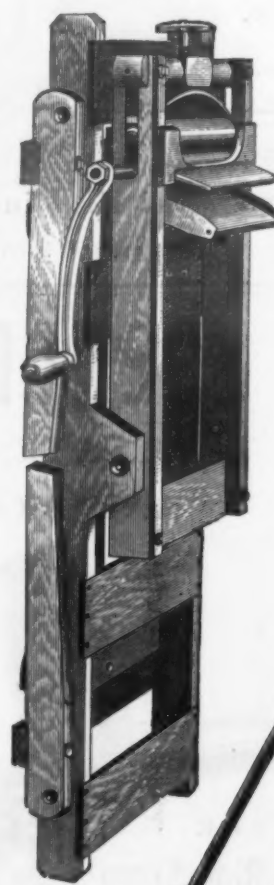
Adams Safety Step Ladder.
PATENTED Feb. 3, 1880.



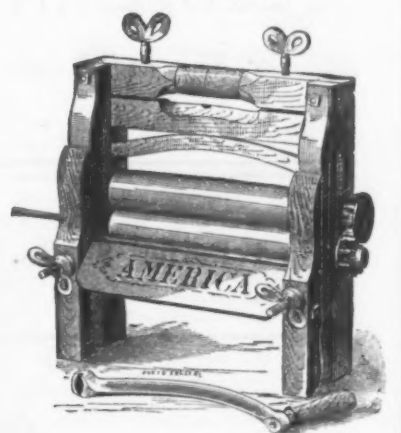
Reversible Clothes Horse.
PATENTED,



Folded.



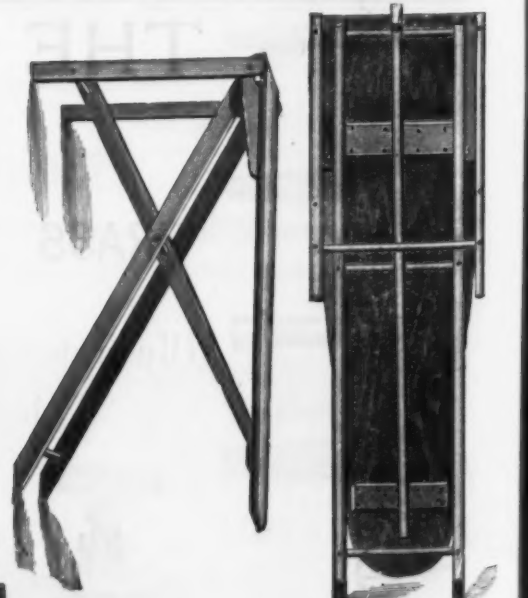
The America Wringer.
No. 8, Family Size.



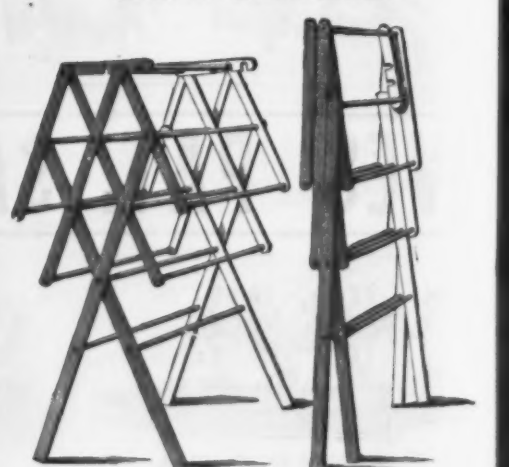
Duplex No. 2 Swing.



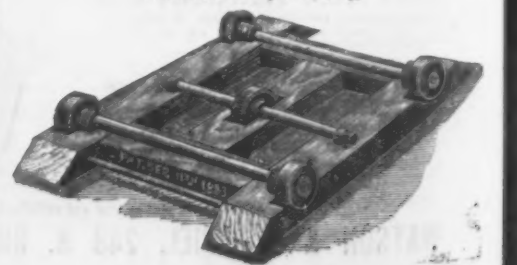
Adams Ironing Table.



Excelsior Clothes Horse.



The Adams Iron-Wheel Truck.
PATENTED Sept. 11, 1883.





The National Cash Register

Wm. H. Maher, in the Chicago Inter-Ocean, says: "Don't dump your cash in a drawer and not know at night what is there until you count it."
The adjoining cut represents the largest size Register, which is 23 inches high, 20 inches wide and 17 inches deep. A touch of any one or more of the keys rings an alarm bell, opens the cash drawer, shows on the tablets in the glass opening above the amount of the sale, and records the same on wheels inside. In a few minutes after the close of business each day the proprietor knows the exact amount of his sales.
Messrs. Blanchard, Farrar & Co., Boston, Mass., say: "We are very well pleased with the Cash Register. It is just the thing we have been looking for."
H. H. Lee, Grocer, Indianapolis, Ind., says: "I have one in each of my four stores. It will check every cent taken in better than a cashier. It will show how much money ought to be in the drawer at any time. The drawer can be used just like any other cash drawer. It is always correct."
"It more than answers my expectations. I regret I did not buy one years ago. They are bound to come into general use in this country."
J. W. ALLISON, Liverpool, England.
They can be made of any denomination and adapted to all foreign currencies—English, French, Dutch, German, Spanish, Egyptian, Japanese, Chinese and Persian.

Agents wanted in all cities. Two hundred in use in the United States.
Nat'l Cash Register Co., Dayton, O.

ROCK and ORE BREAKERS and CRUSHERS.

(The Blake Style.)

This style of Rock Breaker, after 15 years' practical test at HOME and ABROAD, has proved to be the best ever designed for the purpose of breaking all kinds of hard and brittle substances, such as:

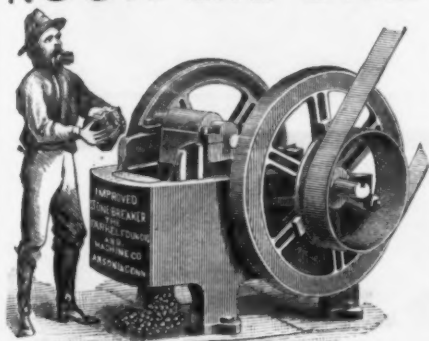
Quartz, Emery, Gold and Silver Ores, Coal, Plaster, Iron, Copper, Tin and Lead Ores.

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RAILROAD BALLAST AND CONCRETE.

Mr. S. L. MARSDEN, who for the past 15 years has been connected with the manufacture of the "Blake Crusher," superintends the making of the machine.
Gold Medal awarded at the Massachusetts Mechanic Association, 1881, and Silver Medal (Special) at American Institute, New York, 1883. Address

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1885 BUFFALO STOVE BOARDS.



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ZINC, PAPER LINED.

BRIGHT AND BLACK EMBOSSED.

Round, Square and Oblong.

THE ABOVE CUT ILLUSTRATES OUR NEW DESIGN FOR 1885.

The Stove Boards made by us this season are the hand-somest in market.

There can be no question that Zinc Stove Boards are the SAFEST, CHEAPEST and BEST for use.

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EXCLUSIVELY HAND-CUT FILES and R. & P. S.

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THE CHELSEA FILE WORKS

NORWICH, CONN.



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SOLID EMERY Knife Sharpeners.

A FEW OF THE REASONS WHY IT IS THE BEST

- 1st—It does the work quickly, a few strokes being sufficient to give the dullest knife a sharp, keen edge.
- 2d—It is handy to use, either at the table or in the kitchen.
- 3d—Its durability. It is not emery coated, but made solid of the best Turkish Emery, and will last for years.
- 4th—It is strong; the steel wire in center prevents it breaking with ordinary use, and the method of fastening handle keeps it from working loose.
- 5th—It will not glaze in use.
- 6th—It is neat and attractive; the handle is of hard wood, well finished, and ferrule nickel-plated.
- 7th—It sells readily; price is reasonable and affords the dealer good profit.

Sample orders solicited.

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9 & 11 South Water Street Cleveland O

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PATENT APPLIED FOR.

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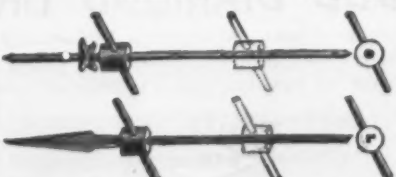
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Neat, Strong, Durable, Cheap. Instantly adjusted and instantly removed, light and convenient in handling, simple and well made. We desire to call special attention to the following points:
1. It is instantly adjusted—in less than a second's time.
2. There is no thread to strip or to become clogged and immovable under rough usage.
These features alone should commend this wrench to all workmen; but we wish to attract the buyer's notice to one more point, practical only with this wrench. All pieces being numbered, they can be renewed at trifling cost by ordering direct from the factory. This wrench, therefore, is more lasting than any screw wrench, which becomes useless when any part is broken. Liberal discount to the Trade. Made only by

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PARIS, 1878.



Manufacturers of the celebrated Snell's Ship Augers, Ship Auger Pattern Car Bits, Ship Auger Bits and Ship Augers with extra length twist, for Bridge Builders, Dock Builders, Railroad use, and especially designed for Car Builders and Millwrights, both with and without screws. These goods are produced from a special steel by new and improved machinery, the labor being performed by skilled mechanics, and they are of superior quality and finish, and fully warranted in every particular, and are of the highest standard of perfection attainable.

Snell's Celebrated Extra Cast Steel Auger Bits and Russell Jennings' Pattern Auger Bits.

Snell's Warranted Superior Cast Steel Car Bits, used by all the large car manufacturers of the United States, and have the highest reputation.

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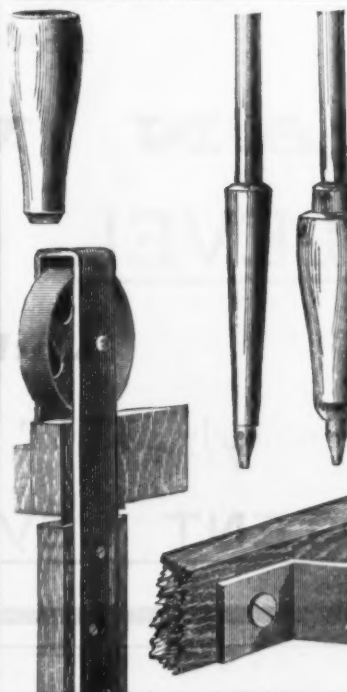
Snell's Improved Screw Driver Bits (Clark's Pattern), Taper Pod Bits, Dowelling Bits, Countersink Bits, Plug Bits, Nail Sets and Gimlets.

All varieties of Machine Augers and Bits made to order.

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We also offer a new device for setting fence posts and hop poles, fully illustrated here. We claim that we can set with this device more fence posts in a given time than by any other means. To use the bar, first penetrate the soil to the depth required with the smaller bar (see cut), then apply expander or shell, and enlarge the hole to suit the size of the post. These bars all have forged steel points which may be sharpened when dulled. We guarantee that one man can save the price of the bar in setting posts one day, as he can make from 40 to 60 holes each hour.

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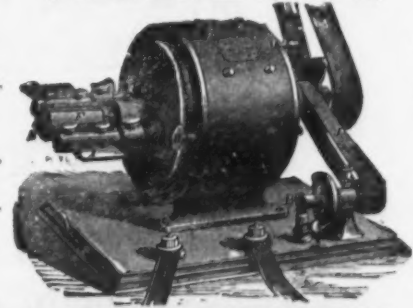
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NICKEL PLATING.

(FIRST HANDS IN ALL THESE GOODS.)

MANUFACTURES:
Pure Nickel Anodes,
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Gold Salts,
Silver Salts,
Copper Salts,
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and Solutions.
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Nickel, Silver
and Other Batteries.



WESTON DYNAMO-ELECTRIC MACHINE

For Nickel, Bronze, Brass, Copper and Silver Plating. A greater number in use than all others combined.
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CATALOGUES AND PRICES ON APPLICATION.

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Best Nickel and Silver
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IMPORTERS:
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Fumee Stone,
Sea Horse,
Felt Wheels,
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Polishing Brushes.

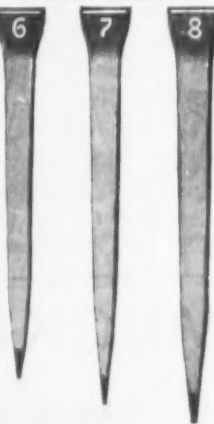
LARGE HEADS.

CHAMPION

CITY HEADS.



Horse Nails



Manufactured from very best SWEDISH METAL. Will not split. Are accurately pointed, tough, strong and hold the shoes. Soft enough to clinch readily; stiff enough to drive without bending. All nails uniform and perfect. They are used in thousands of shops with the best of satisfaction, and are especially liked by "floor-men" for their good, reliable driving.
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QUALITY GUARANTEED.

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TUCKER & DORSEY MFG. CO.,

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KRAUT CUTTERS.

No 1.....	1 knife, with box, 8 x 26, "per dozen.
" 2.....	2 knives, " " " "
" 3.....	3 " " " "
" 4.....	4 " " " "
" 5.....	3 " " 9 x 30, " "
" 6.....	2 " " 12 x 36 each. " "
" 7.....	3 " " " " " "
" 8.....	4 " " " " " "
" 9.....	3 " " 12 x 40, " "
" 10.....	4 " " " " " "



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Tucker's Alarm Tills, Steak Mauls

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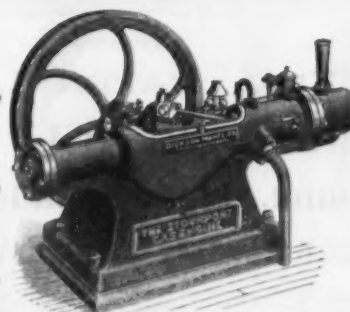
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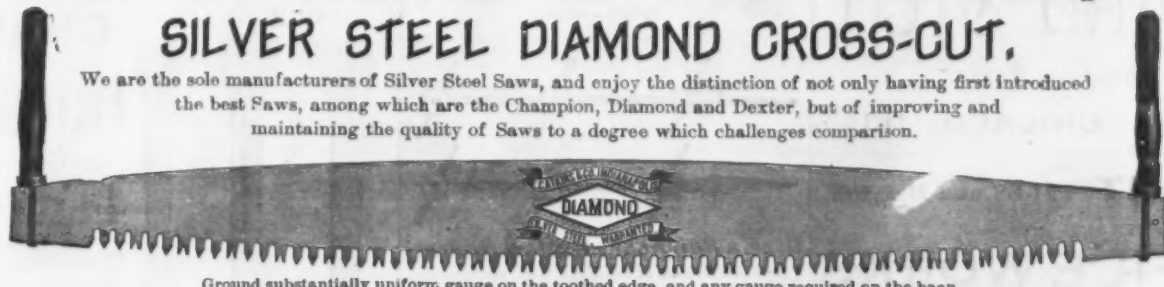
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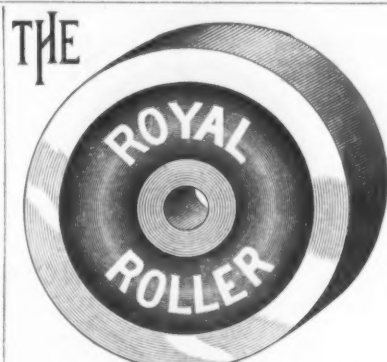
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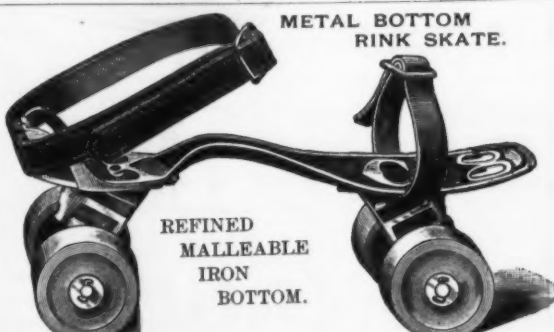


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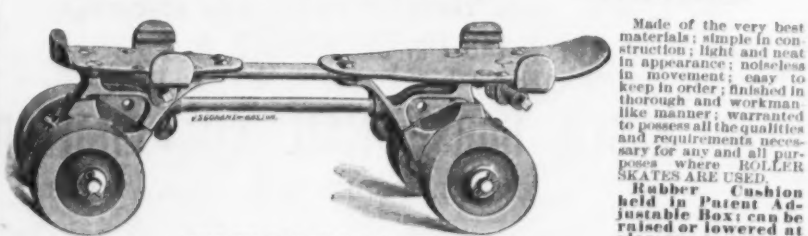
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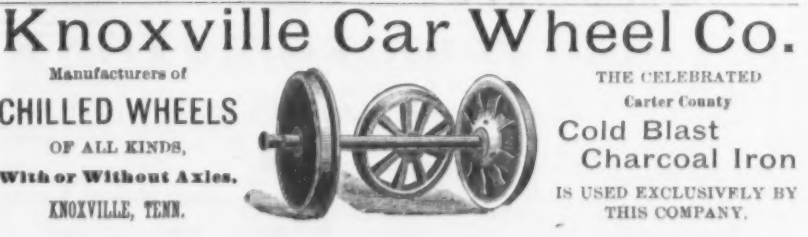
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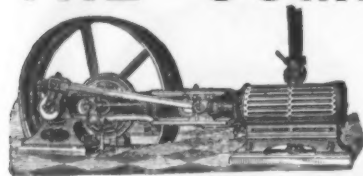


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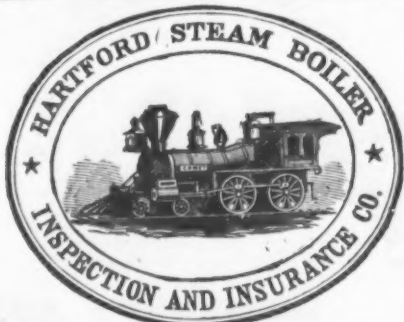


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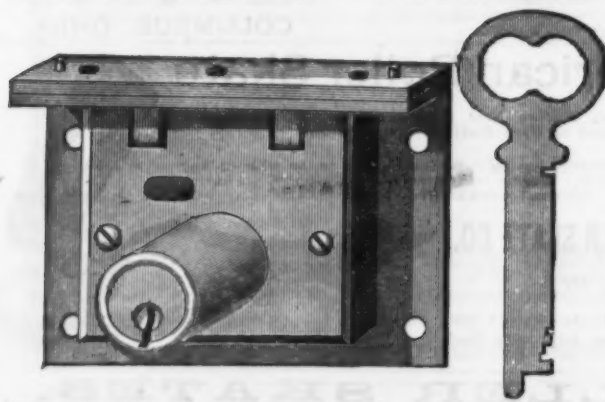
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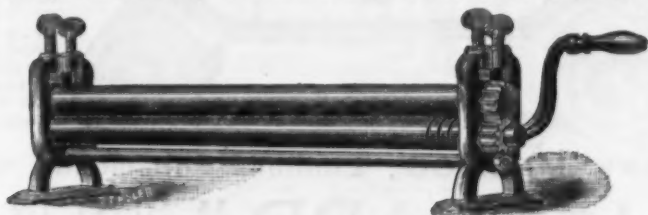
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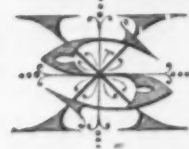
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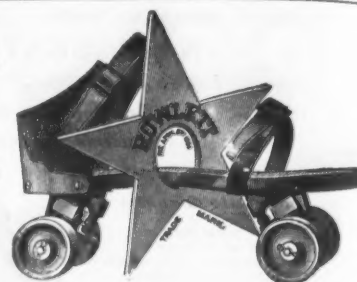
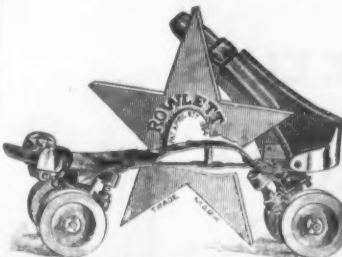
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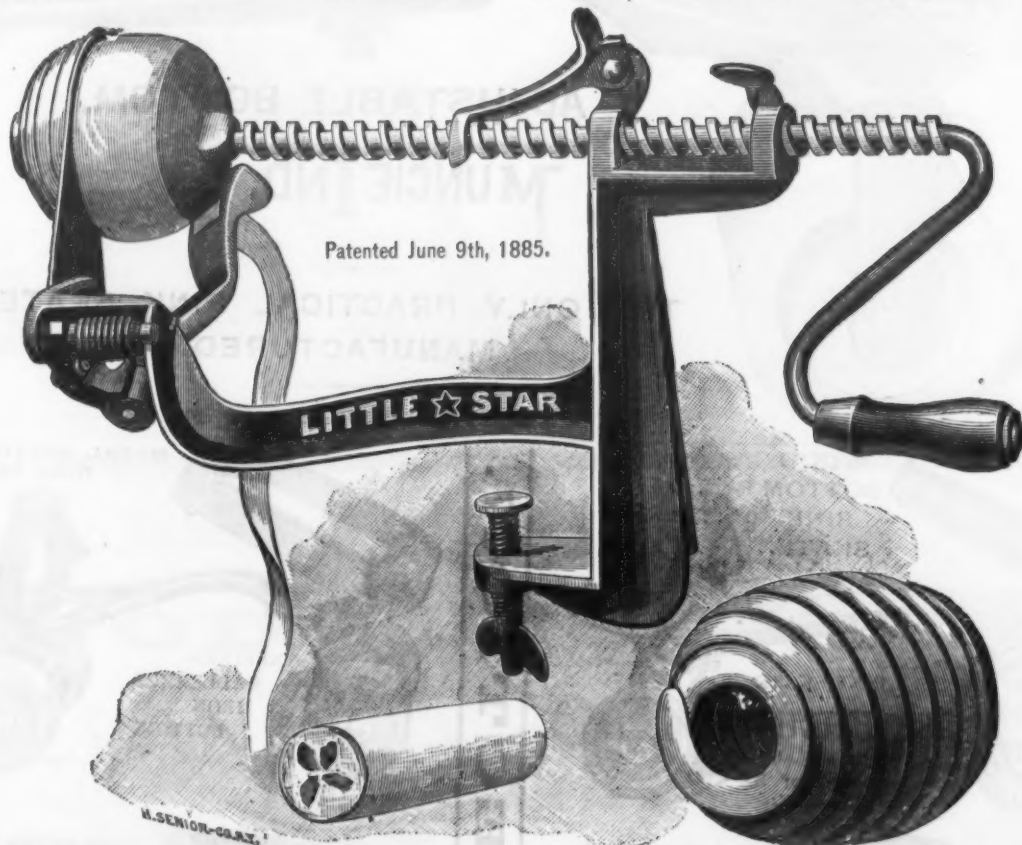
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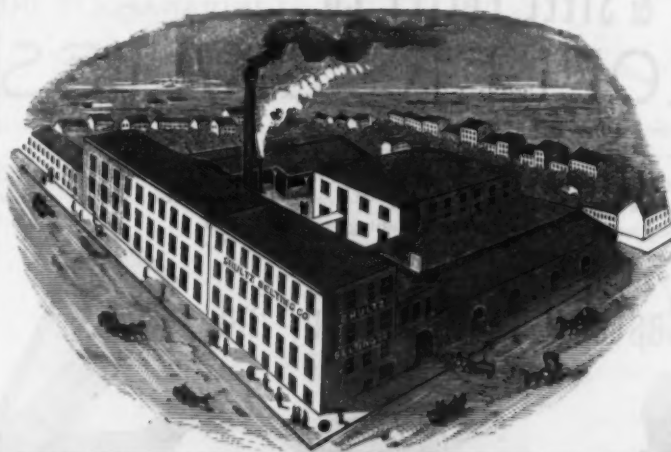
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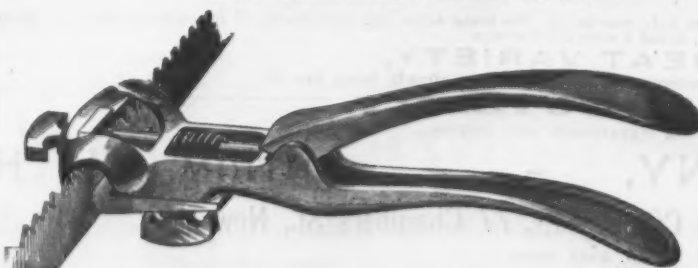
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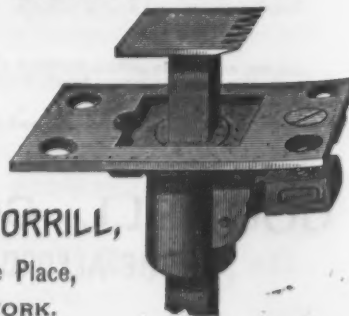
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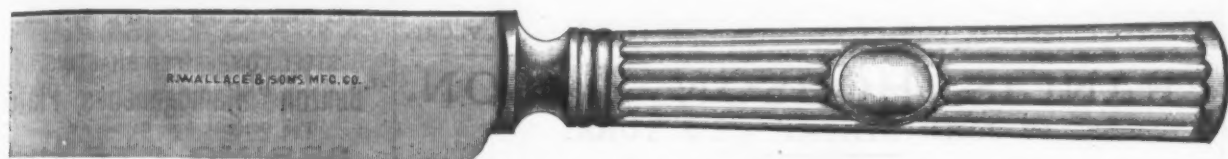
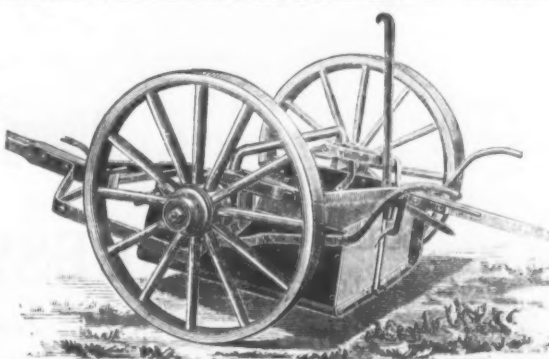
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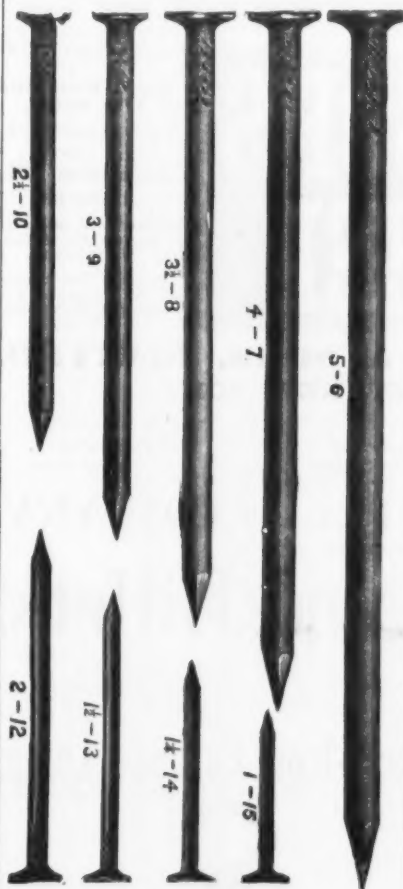
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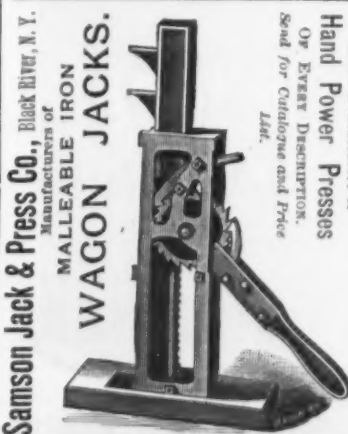
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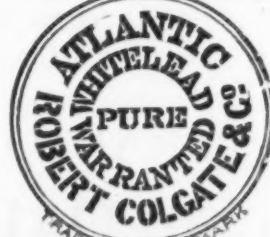


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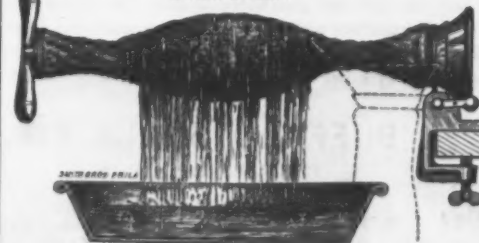
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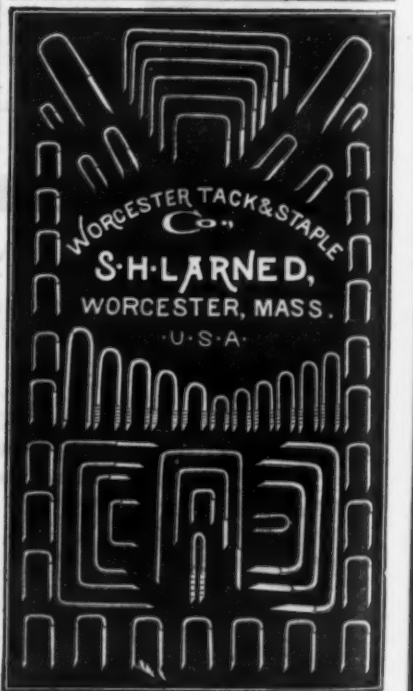
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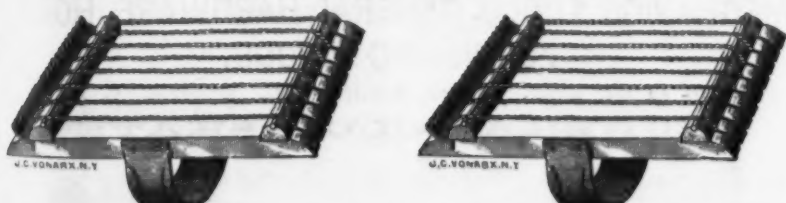
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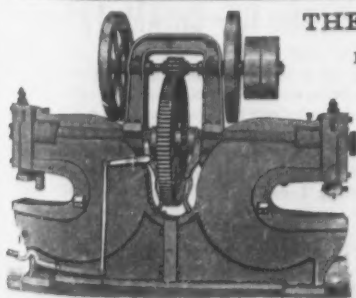
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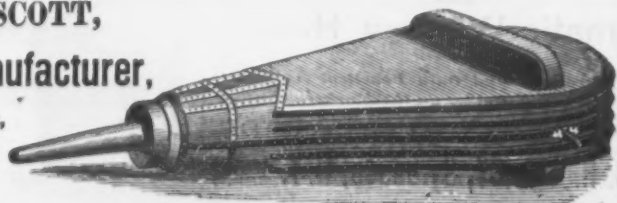
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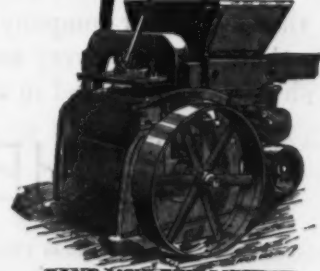
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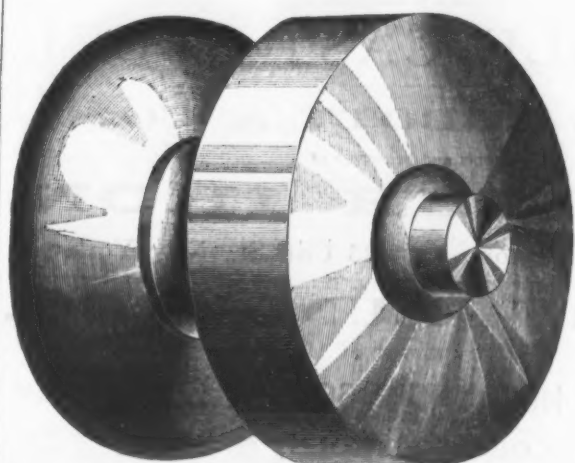
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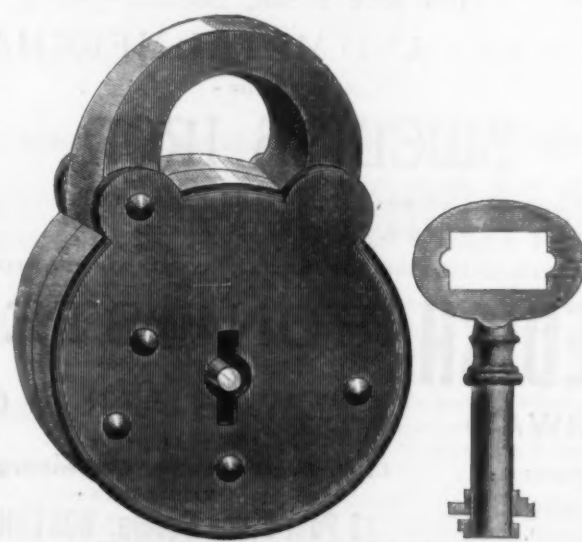
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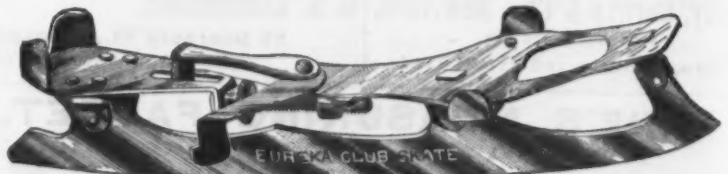
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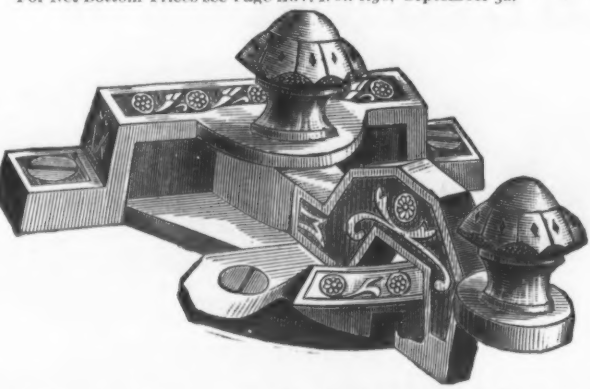


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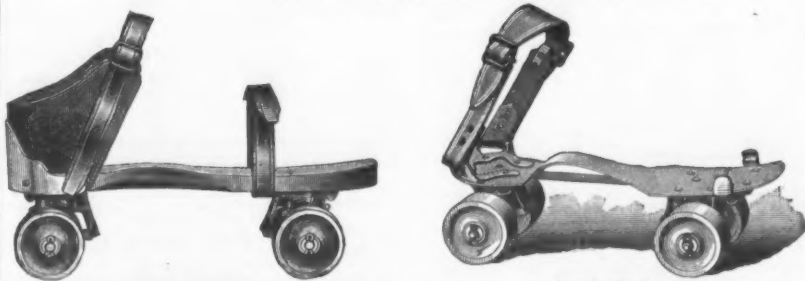
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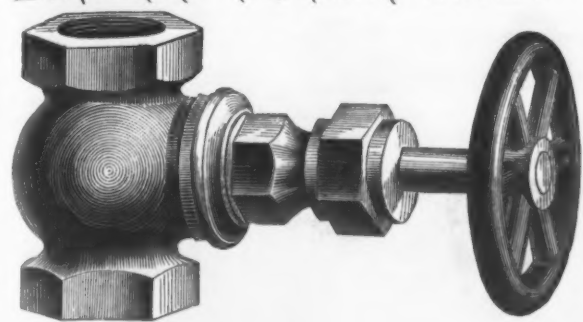
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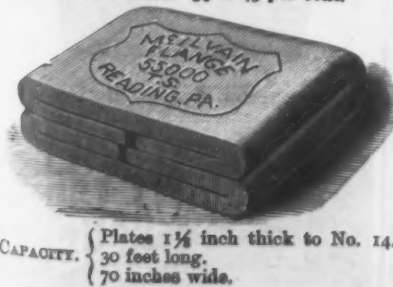
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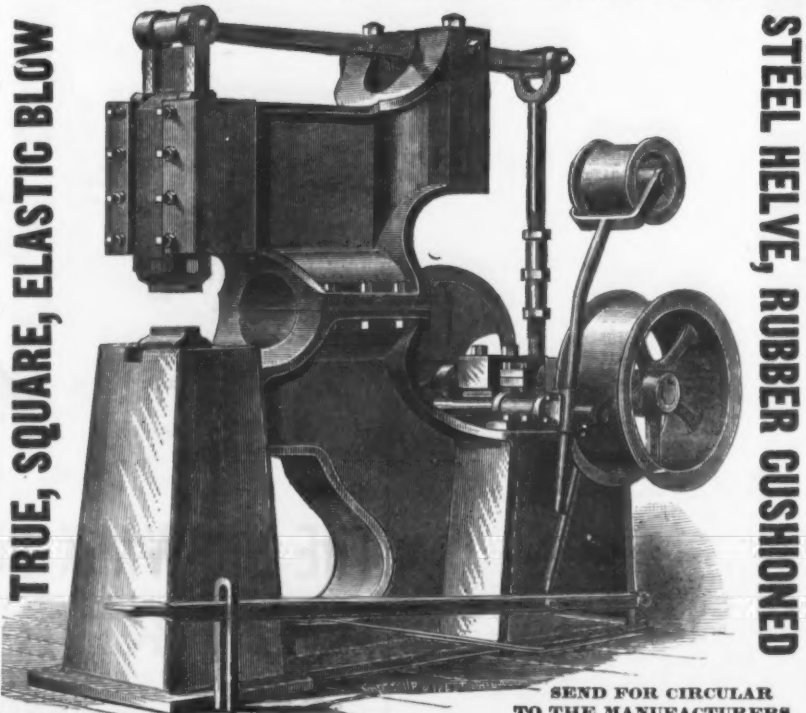
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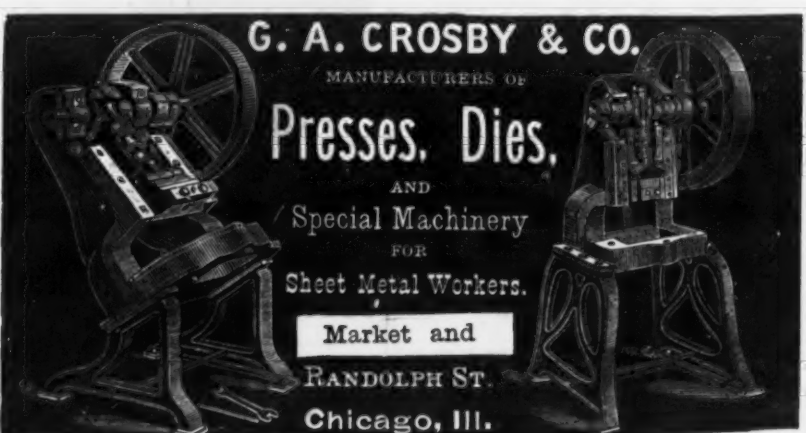
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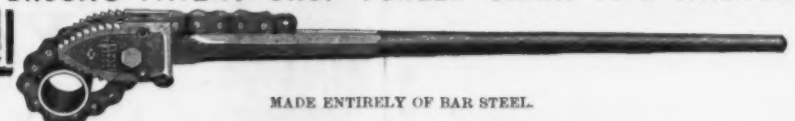
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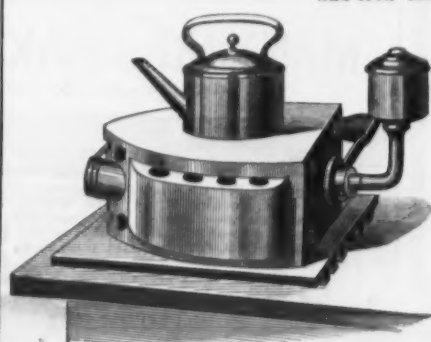
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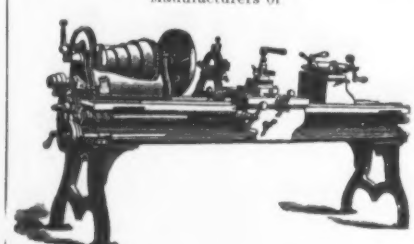
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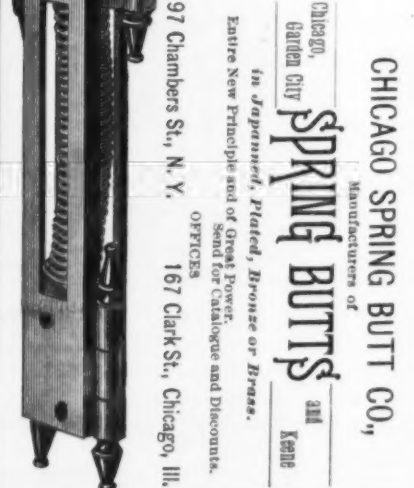
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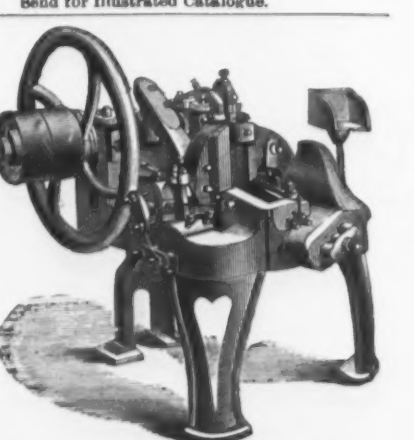
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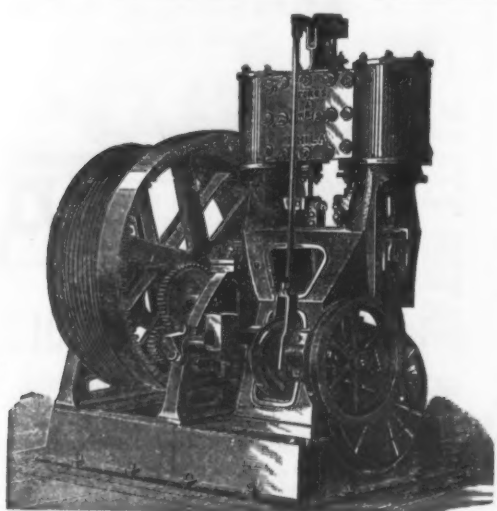
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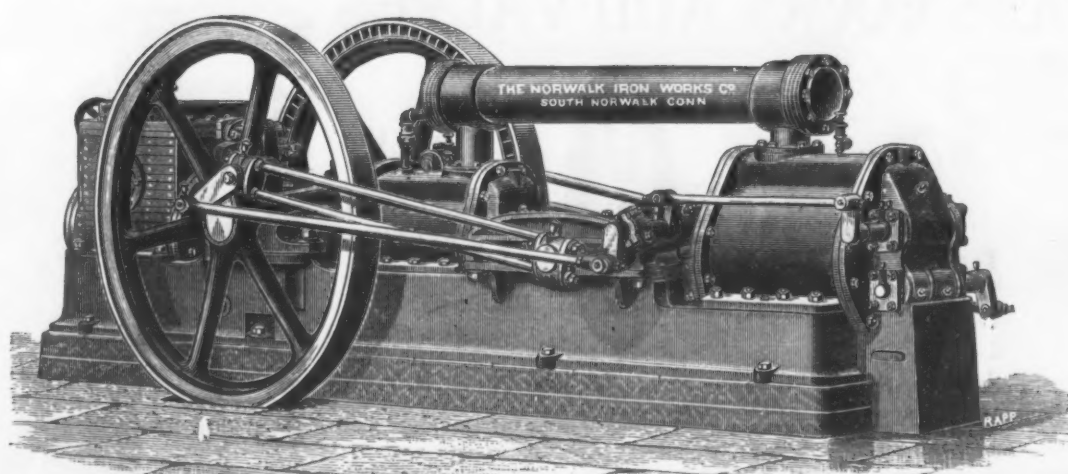
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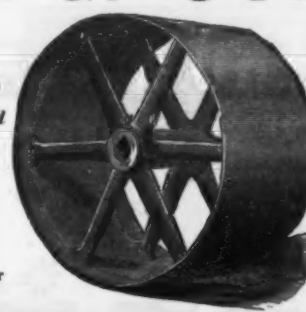
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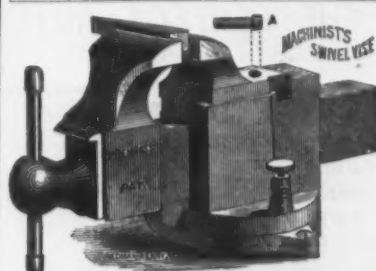
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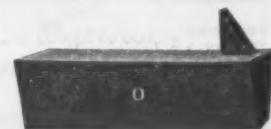
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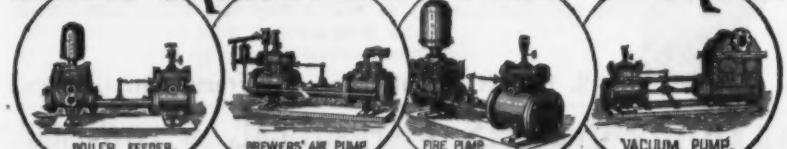
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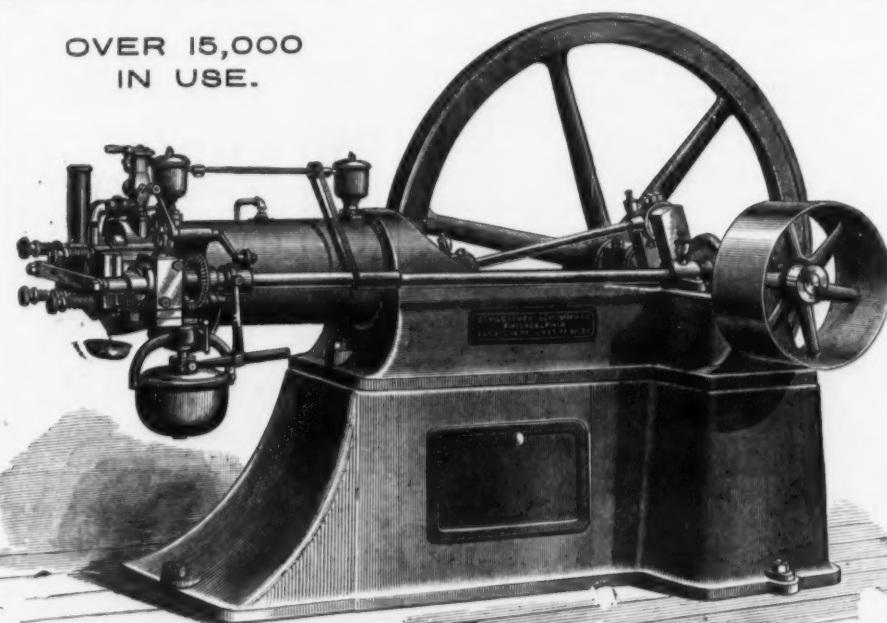
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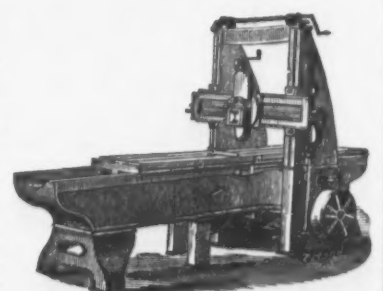
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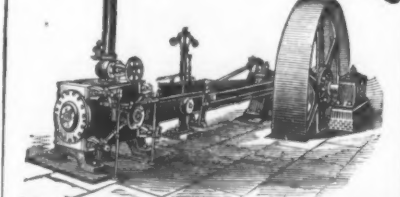
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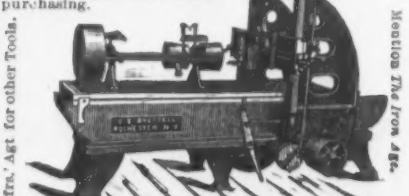
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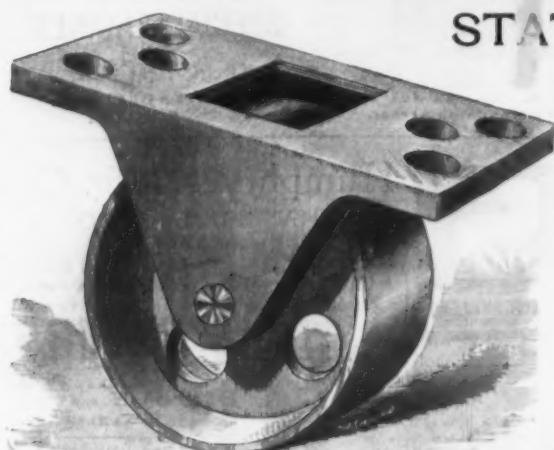
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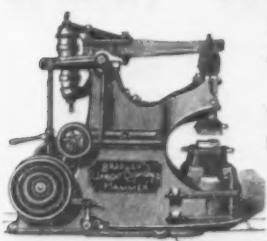
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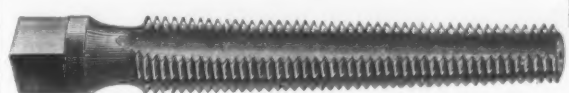
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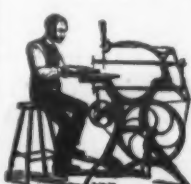
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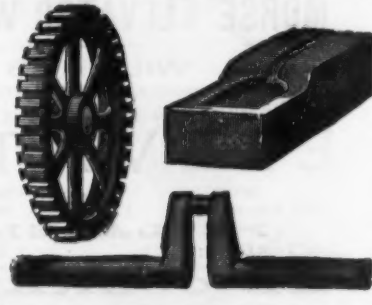


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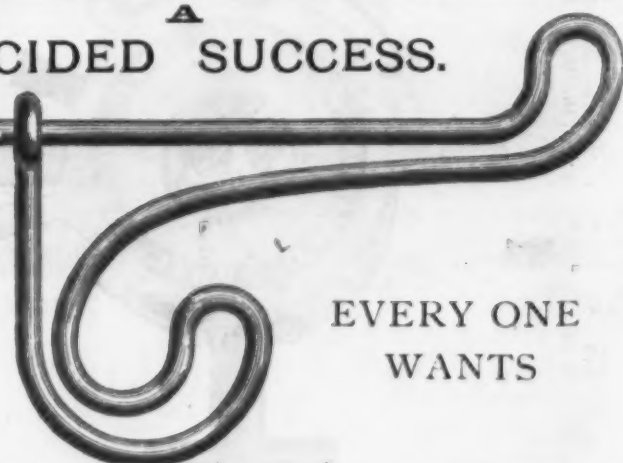
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